

## SPARC<sup>®</sup> Enterprise M5000 Server

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**Pages** 38

### SPARC<sup>®</sup> Enterprise M5000 Configuration Diagram

- **New products:** M5000-GR20, M5000-CL09-PI01, M5000-CL10-PI01, M5000-CL11-12-PI01
- **Withdrawn products:**
- **Some minor corrections:** Chapter “Mounting additional Memory with different sizes”

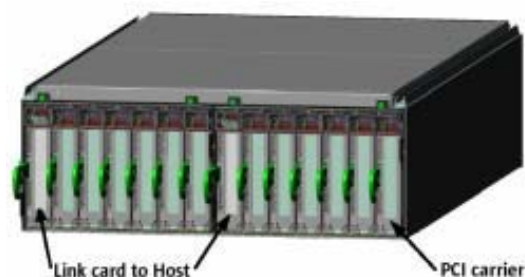
#### SystemArchitect PRIMEPOWER (PW) Hotline

For further questions related to configurations for SE M5000 Systems with PC-ARCHITECT or SYSTEM-ARCHITECT do not hesitate to get in contact with SystemArchitect PRIMEPOWER (PW) Hotline:  
mailto:SA-PW.Hotline@fujitsu-siemens.com  
Please add the respective configuration file (SAR-FILE)!

#### Picture SPARC<sup>®</sup> Enterprise M5000 server



#### Picture I/O Box for PCI expansion



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## Recommended 19"- rack PRIMECENTER 2 with 1100 mm depth

24 HU height	38 HU height	46 HU height
+ 2 x 2 HU vertical	+ 3 x 2 HU vertical	+ 4 x 2 HU vertical
S26361-K826-V212	S26361-K826-V213	S26361-K826-V214

- SPARC® Enterprise M5000 servers can be mounted in PCR2 Rack versions with 1100 mm depth.
  - If the mounting kits do NOT fit to the required rack, please order additional kits separately. For more details refer to the Product Facts: PrimeCenter Rack-Design Guide and Configuration PrimeCenter Rack.
  - **To integrate a server or I/O-Box into a Rack by Factory additional Order numbers are mandatory (see chapter "Rack integration order numbers")!**
  - **Safety Attention:**
    - To mount an M5000 server into a rack you have to take notice for the rules which are described in the "Installation Guide" for Form factor models.
    - M5000 System Base Unit is only allowed to be mounted up to Rack height unit 27 (lowest system height unit)
- Up to 3 x M5000 serves in a common Rack are allowed!



Primecenter\_24

Primecenter\_38

Primecenter\_46

Installation of PRIMEPOWER servers and SPARC® Enterprise Servers in other 19" racks than PCR2 is supported only, if „the PRIMEPOWER - Rack Installation Guidelines for PRIMEPOWER systems“ are fulfilled.

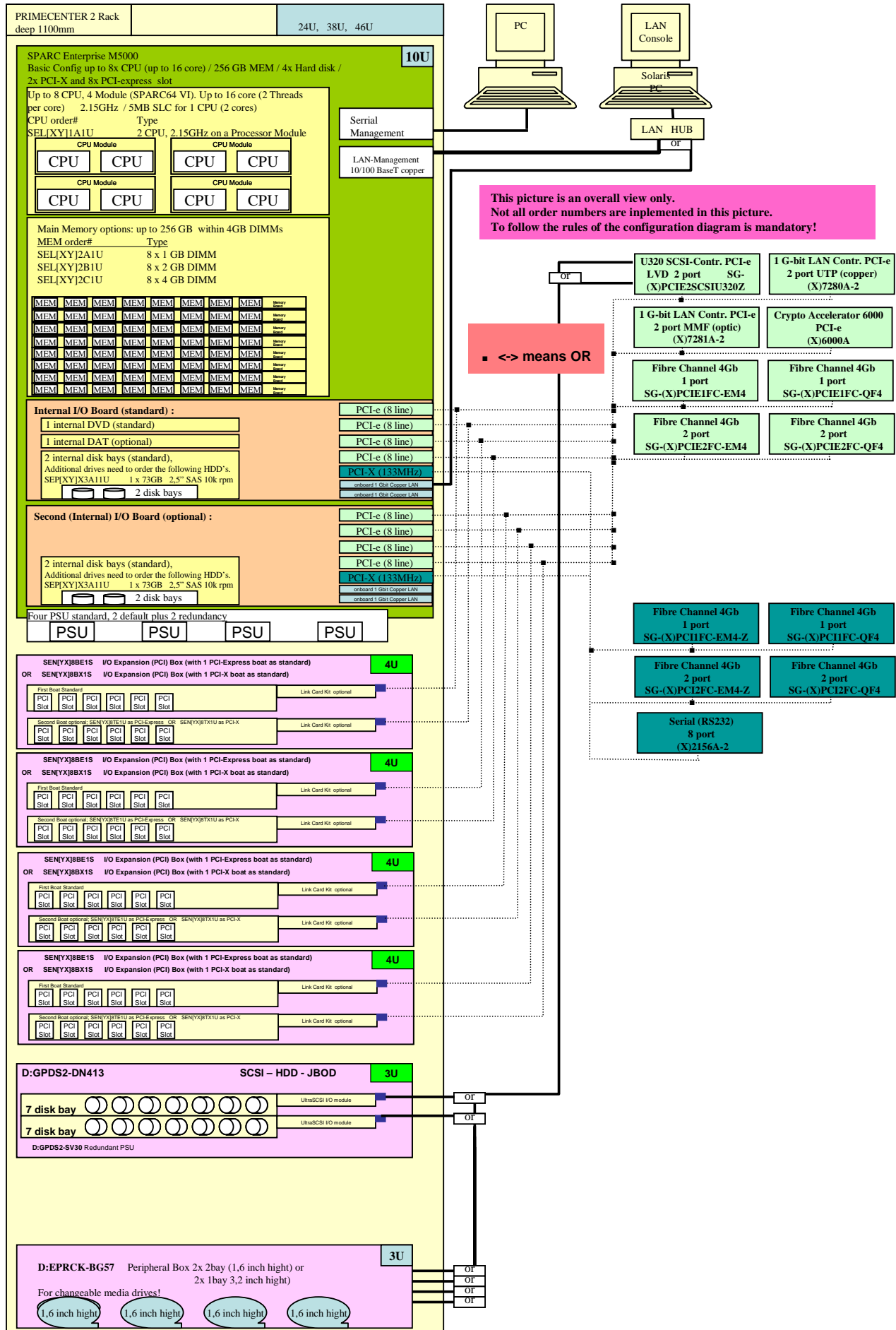
For more information see the FSC extranet at:

<http://manuals.fujitsu-siemens.com/servers/sparc/m4m5io-pc-rack-install-en-01.pdf>

## Overview M4000 and M5000

	SPARC® Enterprise M4000	SPARC® Enterprise M5000
Enclosure	Rack 6U	Rack 10U
CPU / Processor Chips (multi-core, multi-thread (VMT))	4 x 2.15GHz SPARC®64VI (2 per module)	8 x 2.15GHz SPARC®64VI (2 per module)
Cores / Threads per System	8 / 16	16 / 32
Cores / Threads per processor Chip	2 / 2	
Primary Cache per core	Instruction 128 KB / Data 128 KB	
SLC (Second Level Cache) per Processor Chip (2 cores)	5 MB	
MBU (Mother Board unit)	2 CPU Modules (each 2 CPU chips on CPU Module)	4 CPU Modules (each 2 CPU chips on CPU Module)
	4 Memory Boards (each 8 slots DDR-II SDRAM)	8 Memory Boards (each 8 slots DDR-II SDRAM)
Max. Memory by using max DIMMs	128 GB	256 GB
max DIMM Slots (DDR-II)	32	64
Memory per expansion unit	8GB, 16GB or 32 GB (8 DIMMs per unit)	
Multi domains (partitions)	2	4
Minimum domain configuration	1 CPU chip, 8 DIMMs, 2 PCI-Express slots at the smallest	
Memory RAS feature	ECC, Advanced ECC	
IOU (I/O Unit, hereafter called I/O board)	1	2 (second IOU is expansion)
Internal PCI Slots	4 PCI-E (8 lanes per PCI slot) 1 PCI-X (133MHz)	8 PCI-E (8 lanes per PCI slot) 2 PCI-X (133MHz)
Max. Internal Disks (2.5"SAS)	2	4
Removal media	DVD (Standard); DAT (Option)	
On-board GbE port 1000Base-T	2	4 (2 on each IOU)
On-board Serial	-----	
External IO exp.	Yes	
Max. Number of IO-Boxes	2 Boxes (each max 12 PCI slots) mounted to 1 IOU, occupies 4 internal PCI-E slots	4 Boxes (each max 12 PCI slots) mounted to 2 IOU, occupies 8 internal PCI-E slots
Max. Number of PCI slots (internal plus I/O-Boxes)	25	50
Redundant parts	HDD*, PSU, FAN, PCI-Cards*, DIMMs**  (*Software support & consideration on configuration are required; **Memory Mirror function)	
Hot-replacable parts (Hot swap)	HDD, PSU, FAN, PCI-cards, I/O-Boxes, DAT	
Dynamic degradation	CPU chips, memory, power supply units, fans, HDDs, PCI cards (only in multi-path configuration)	
RAS Management	XSCF	
RAS features	All major components can be automatically deconfigured after rebooting, Deconfiguration minimizes system impact in case of an uncorrectable error Finer granularity to prevent propagation of errors Buses between ASICs are protected by ECC Memory mirroring (optional)	
XSCF - Interfaces	2 LAN interface 100Base-TX (RJ45) 1 serial port RS232 (RJ45) 1 RCI interface, Fujitsu/FSC proprietary interface 1 USB port (for service only)	

# System Architecture



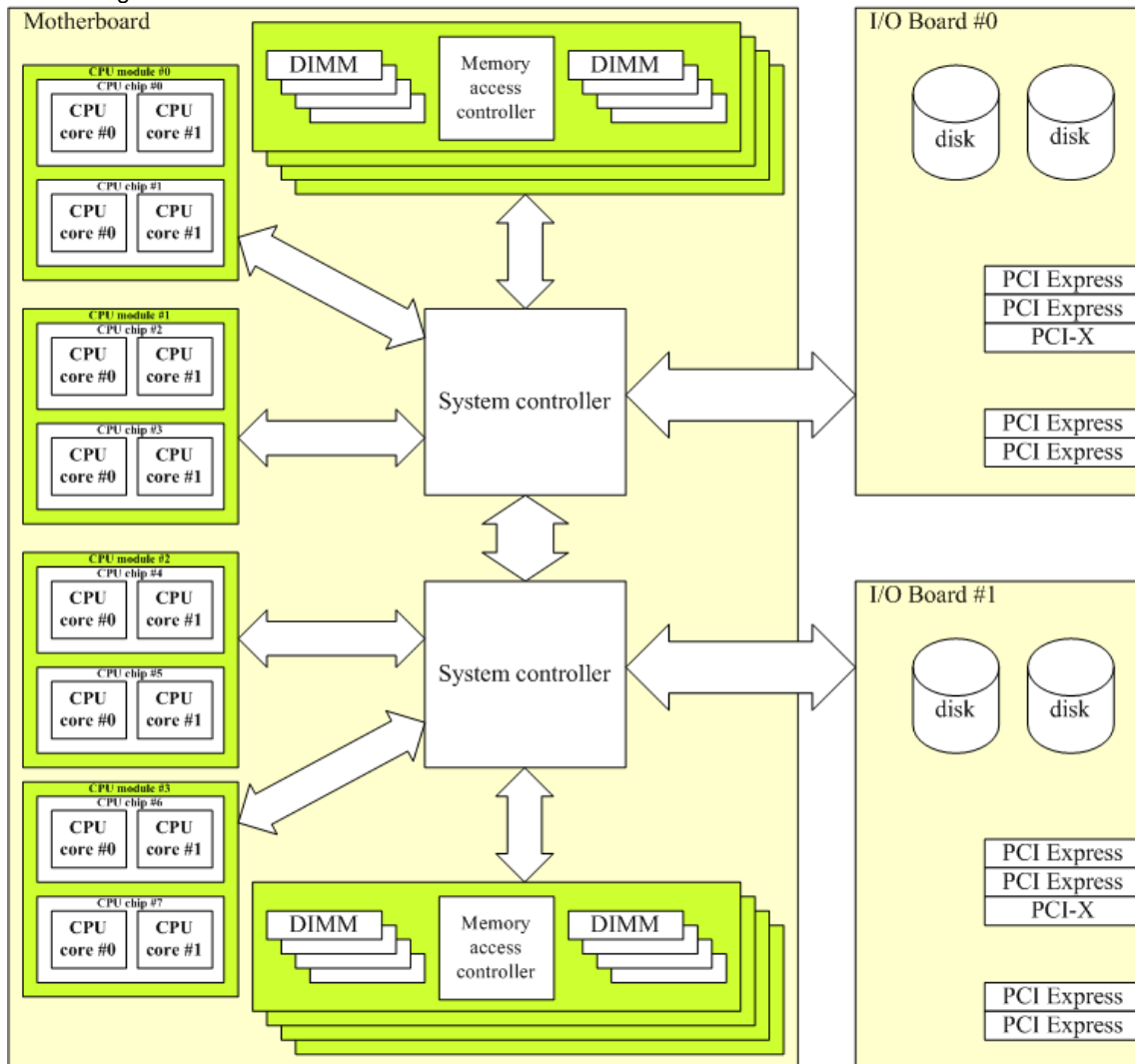
## Product Overview SPARC® Enterprise M5000

SPARC® ENTERPRISE M5000 is a midrange server developed using the expertise of Fujitsu and Sun Microsystems. It has been designed to be the best choice in mission-critical computing solutions. High scalability comes from eight CPU chips (16 cores) and is backed by exceptional reliability and excellent means for asset investment protection. Based on SMP (Symmetric Multi Processing) architecture it delivers high scalability without change to applications.

### Features

#### 1. SPARC® ENTERPRISE M5000 is a scalable enterprise server.

- Up to eight dual core CPU chips can be installed.
- Up to 256 GB of memory and 50 I/O slots (when four I/O Boxes are connected) are supported for excellent scalability.
- The maximum data transfer performance of 64 GB/s ensures excellent linear scalability up to 16 processor-cores in an SMP configuration.



#### 2. Dual-core SPARC®64 VI processors are used in this server.

- 90 nm copper wiring technology is used in the processor to provide higher performance at lower power consumption.
- The dual-core processors have large caches (primary cache: instructions 128 KB + data 128 KB per CPU core; secondary cache: 5 MB per CPU chip) appropriate for enterprise class server systems.
- Multi-core and multi-threading technologies ensure high parallel-processing performance.
- Both the primary and secondary cache use ECC (Error Checking & Correction) for high reliability.
- Registers and ALU are all parity protected. This further enhances the high reliability of the server.

#### 3. Integrated high-reliability makes this server suitable for 24-hour operation.

- All address/data paths between key LSIs, such as CPU chips, memory controllers, I/O controllers and system controllers, are ECC protected for higher reliability.
- Key components are redundant and hot replacement is supported.

**4. Very flexible partitioning functions are provided.**

- Multiple independent systems can be built on a single server called partitions or domains.
- Each partition can individually be configured.
- Up to four partitions are supported.
- The motherboard on which CPU- and memory-modules are mounted is sub-divided into eight parts, and the two I/O board are sub-divided into four. A combination of sub-parts from motherboard and I/O board form a partition, in maximum 4.

**5. Partition independent processor based system control facility: XSCF (eXtended System Control Facility)**

- XSCF detects abnormal conditions and controls the system without relying on system status, such as CPU abnormality or system hang. (Mutual monitoring/abnormal CPU notification, fan rotation frequency monitoring/control, power monitoring/control, humidity/temperature monitoring, etc., are provided)
- Monitoring/control of peripheral devices such as RCI-connected units (cluster nodes) and expansion cabinets is available via RCI (Remote Cabinet Interface). Remote power-on/off is also available.
- The operational status of the server can also be monitored by XSCF.
- The embedded partition control facility renders the need for an external control console terminal unnecessary.

**6. Remote Customer Support**

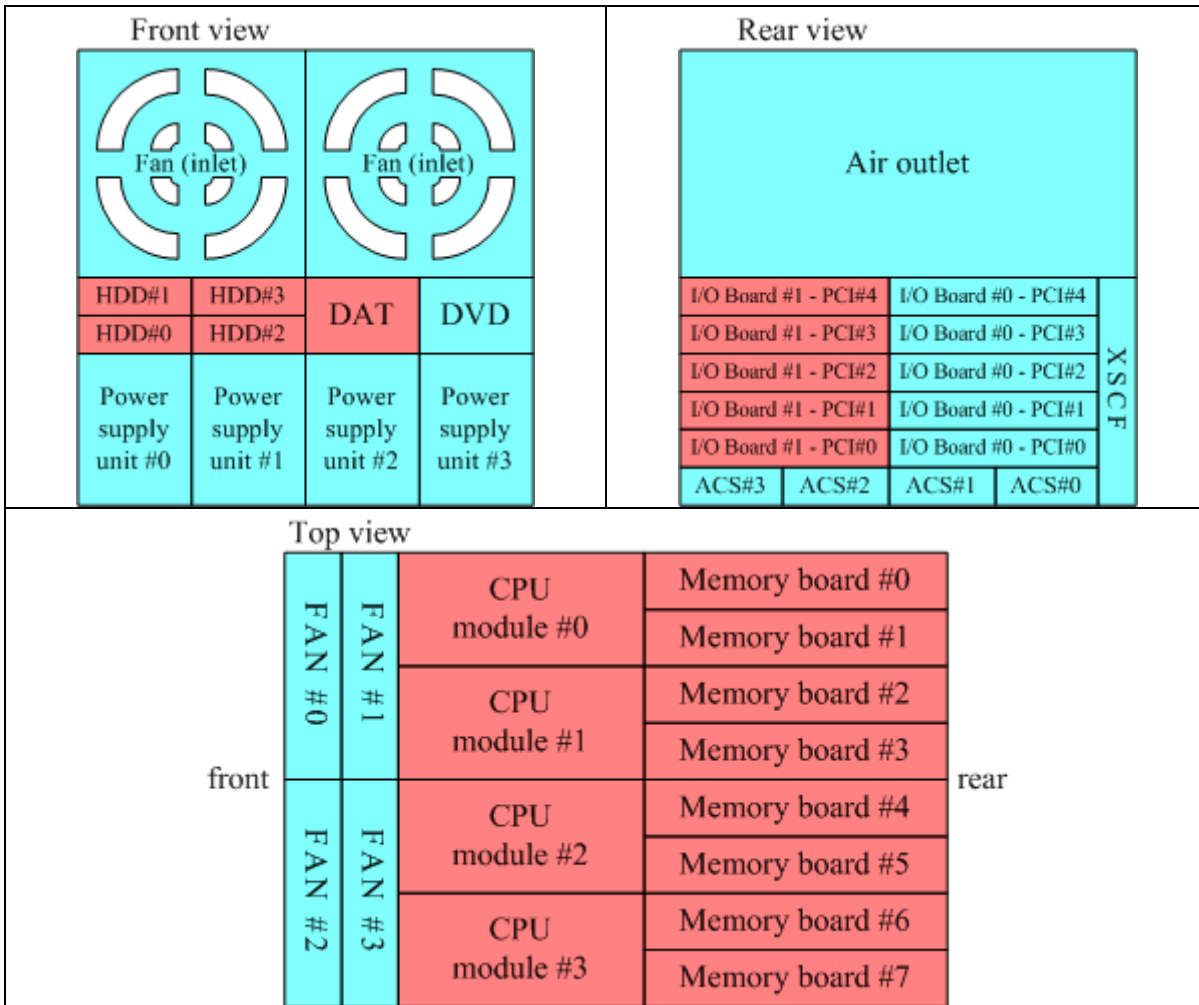
- Remote Customer Support will be handled via Teleservice.

**7. ServerView Enterprise Edition 2.0 is available for download in the FSC Software Pool.**

- ServerView Enterprise Edition 2.0 provides consolidated management of all FSC servers including PRIMEPOWER, SPARC® Enterprise, PRIMEQUEST and PRIMERGY. Server managing functions for all managed servers, such as hardware configuration display and status monitoring, are provided for system administrators via a unified GUI and standard operating processes.
  - a. The status monitoring of all servers is available from a single management client. The status of key components, such as CPU/memory of each server, can be displayed in a unified tree view.
  - b. When server components fail, SVS EE displays each event graphically together with the relevant message for prompt defective part location.
  - c. Server management can be performed with unified operability.

**8. The DR (Dynamic Reconfiguration) functions are supported.**

9. Configuration Diagram of the Main Unit



\* Areas indicated in blue show components belonging to the base units; those indicated in red show options (purchased separately, but see also base unit description).

10. Hardware for M5000

- Motherboard  
The motherboard carries CPU modules and memory modules. Four CPU modules (eight CPU chips) and eight memory modules (64 DIMMs) can be mounted. The motherboard is part of the base unit.
- 1<sup>st</sup> I/O board (standard)  
The I/O board has a connection to two Hard Disk Drive bays, one DVD Drive bay and one DAT Drive bay. It contains two onboard LAN<sup>2</sup> ports, four PCI Express slots and one PCI-X slot.
- 2<sup>nd</sup> I/O board (optional)  
The 2<sup>nd</sup> I/O board has a connection to two Hard Disk Drive bays. It contains two onboard LAN<sup>2</sup> ports, four PCI Express slots and one PCI-X slot.
- System disk  
Each partition requires at least one system disk for Solaris-installation. System disks can be realized in any of the following ways. To improve system reliability it is recommended to duplicating (mirroring) the system disk.
  - A) Mount a Hard Disk Drive in a disk bay inside the server.
  - B) Ultra 320 SCSI cards, expansion file units together with external HDDs can also be used as system disks.
  - C) When using SAN Boot, fibre channel cards, RAID devices and system disks must be prepared. Use a disk in a RAID device as the system disk. When installing the OS on the RAID device, you need to prepare another installation server, or use one partition as an installation server using method A) above.
  - D) LAN Boot from other SPARC Enterprise Server is also possible.



## M5000 Server Product ID List

PART NUMBER	LONG DESCRIPTION	SHORT DESCRIPTION
<b>M5000 family:</b>		
SEFPAAA1S	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 2x 2.1GHz CPUs (1 2x 2.1GHz CPU Modules), 16GB system memory (2 ea. 8GB memory boards), 2x 73GB HDD, 4 PSU, 1 I/O tray	SE M5000 2.1GHz 2P16GB 2x73GB
SEFPBAA1S	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 4x 2.1GHz CPUs (2x 2x 2.1GHz CPU Modules), 16GB system memory (2 ea. 8GB memory boards), 2x 73GB HDD, 4 PSU, 1 I/O tray	SE M5000 2.1GHz 4P16GB 2x73GB
SEFPBCA1S	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 4x 2.1GHz CPUs (2x 2x 2.1GHz CPU Modules), 32GB system memory (2 ea. 16GB memory boards), 2x 73GB HDD, 4 PSU, 1 I/O tray	SE M5000 2.1GHz 4P32GB 2x73GB
SEFPCBA1S	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 8x 2.1GHz CPUs (4x 2x 2.1GHz CPU Modules), 32GB system memory (4 ea. 8GB memory boards), 2x 73GB HDD, 4 PSU, 1 I/O tray	SE M5000 2.1GHz 8P32GB 2x73GB
SEFPCDB1S	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 8x 2.1GHz CPUs (4x 2x 2.1GHz CPU Modules), 64GB system memory (4 ea. 16GB memory boards), 4x 73GB HDD, 4 PSU, 2 I/O tray	SE M5000 2.1GHz 8P64GB 4x73GB
M5000-GR20	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 2x 2.1GHz CPUs (1x CPU Module), 64GB system memory (2 ea. 32GB memory boards), 2x 146GB HDD, 4 PSU, 1 I/O tray. (included ATO BU SEFASY11S)	M5000 2.1GHz 2P64GB 2x146GB 1xI/O tray
M5000-CL09-PI01	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 6x 2.1GHz CPUs (3x CPU Modules), 64GB system memory (4 ea. 16GB memory boards), 4x 146GB HDD, 4 PSU, 2 I/O tray. (included ATO BU SEFASY11S)	M5000 ATO 6P2.15GHz 64GB 4x146GB 2xI/O Tray
M5000-CL10-PI01	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 6x 2.1GHz CPUs (3x CPU Modules), 96GB system memory (6 ea. 16GB memory boards), 4x 146GB HDD, 4 PSU, 2 I/O tray. (included ATO BU SEFASY11S)	M5000 ATO 6P2.15GHz 96GB 4x146GB 2xI/O Tray
M5000-CL11-12-PI01	Fujitsu-Siemens Computers SPARC® Enterprise M5000 server. Includes M5000 system, 8x 2.1GHz CPUs (4x CPU Modules), 96GB system memory (6 ea. 16GB memory boards), 4x 146GB HDD, 4 PSU, 2 I/O tray. (included ATO BU SEFASY11S)	M5000 ATO 8P2.15GHz 96GB 4x146GB 2xI/O Tray

## M5000 COD (Capacity on Demand) Server Product ID List

PART NUMBER	LONG DESCRIPTION	SHORT DESCRIPTION
<b>M5000family:</b>		
SEFRCD1S	FSC SPARC Enterprise M5000 COD (Capacity On Demand) server. Includes 8x 2.15GHz CPUs (4 CPU boards with 2 x CPUs each, 5MB on-chip L2 cache) and 64GB system memory (4 memory modules with 8 x 2GB DDR2 DIMMs), 4 x 73GB SAS hard disks, 1 DVD-ROM, 2x 1Gb Ethernet ports, 2 I/O trays with 8 PCI-E and 2 PCI-X slots total, 4 power supplies (includes redundancy and DPF). <b>As minimum to each COD System 2 RTU (Right To Use) licenses are required (must be ordered together with the system)!</b>	M5CoD 2.1GHz 8P64GB 4x73GB 2xI/O tray

## M5000 COD (Capacity on Demand) CPU Right to Use (License) Product ID List

PART NUMBER	LONG DESCRIPTION	SHORT DESCRIPTION
<b>M5000 family:</b>		
SELX9RU1S	FSC SPARC Enterprise Server COD 2.0 Right-To-Use (RTU) license for one Capacity-on-Demand (COD) CPU, for use with SPARC Enterprise M4000 and M5000 servers.	CoD RTU license for 1 CPU (FF model)

### Note to COD:

COD Licenses are automatically arranged by the service processor (XSCF) (see also: Server Administration Guide). Licenses can only manually be assigned to domains, but not to hardware components like CPU. If licenses are manually assigned to domains, the licenses will be automatically arranged to the CPU's of this domain, first CPU gets first license which is assigned for this domain, second CPU gets second license and so on. If there is only one big domain, the arrangement is the same: First CPU gets first license which is assigned for this domain, second CPU gets second license and so on. Result for M5000: To use the second system-board in one big domain over the complete system a minimum of 5 licenses is necessary!  
In addition the "Note to Memory ordering" is also permissible for COD server!

## M5000 Internal Storage Device Product ID List

Marketing P/N	Option Description	Maximum Number Supported per System	Comments
SEPX3A11U	MR 73GB 10K RPM SAS Hard Disk Drive. Without factory integration!	Up to 4 per M5000	2 <sup>nd</sup> I/O tray required for HDD 3 & 4 on M5000
SEPY3A11U	MR 73GB 10K RPM SAS Hard Disk Drive. Factory integration only!	Up to 4 per M5000	2 <sup>nd</sup> I/O tray required for HDD 3 & 4 on M5000
SEPX3C11U	MR 146GB 10K RPM SAS Hard Disk Drive. Without factory integration!	Up to 4 per M5000	2 <sup>nd</sup> I/O tray required for HDD 3 & 4 on M5000
SEPY3C11U	MR 146GB 10K RPM SAS Hard Disk Drive. Factory integration only!	Up to 4 per M5000	2 <sup>nd</sup> I/O tray required for HDD 3 & 4 on M5000
SELX9DT1U	DAT 72 Tape Drive. Without factory integration!	Up to 1 per M4000 Up to 1 per M5000	
SELY9DT1U	DAT 72 Tape Drive. Factory integration only!	Up to 1 per M4000 Up to 1 per M5000	

## M5000 Filter Product ID List

Marketing P/N	Option Description	Maximum Number Supported per System	Comments
SEEX9FL1U	M4000 air filter kit	1 per system	
SEFX9FL1U	M5000 air filter kit	1 per system	

### M5000 Power Cords for Rack internal use Product ID List

Attention: For each PSU a Power Cord must be ordered for Rack internal connection (**thickly marked in table below**) to the Socket strip!

Note: M5000 requires 4x 16A power cords, each I/O-Box requires 2x 10A power cords.

In combination with the PSU of the Base Units. & In combination with the PSU of the I/O Boxes.	<b>Power Cord, to a Rack internal Socket strip, 16 A</b> <b>For System Base Units!</b>	<b>Is a Standard Part of each System PSU.</b>
	Socket strip 1-phases 32A SDL 1x 3 jacks IEC320 C19 (16A) 1x 2 jacks IEC320 C13 (10A) 1x plug IEC309 (CEEform blue (32A))	S26361-F2262-E132 S26361-F2262-L132
	Socket strip 3-phases 32A SDL 3x 3 jacks IEC320 C19 (16A) 3x 2 jacks IEC320 C13 (10A) 1x plug IEC309 (CEEform red (32A))	S26361-F2262-E332 S26361-F2262-L332
	<b>Power Cord, to a Rack internal Socket strip, 10 A</b> <b>For I/O-Box!</b>	<b>SERXP333WS</b>
In combination with the PSU of the I/O Boxes.	Socket strip 1x 10 jacks IEC320 C13 (10A) auf 1 x plug CEEform (16A)	S26361-F2262-E40 S26361-F2262-L40
	Socket strip 1x 10 jacks IEC320 C13 (10A) auf 1 x plug NEMA L6-30 (For US / CAN.)	S26361-F2262-E41 S26361-F2262-L41
	Socket strip 1 x 10 jacks IEC320 C13 (10A) auf 1 x plug IEC 320 C20 (16A) for UPS	S26361-F2262-E42 S26361-F2262-L42
	Socket strip 3phase 3x 8 jacks IEC320 C13	S26361-F2262-E31 S26361-F2262-L31
Rack mount Kit	Socket strip Rack mount Kit 2U horizontal	S26361-F2262-E301 S26361-F2262-L301

The offered Socket strips are documented in „ PRIMECENTER Rack Power Connection Concept “:  
[http://extranet.fujitsu-siemens.com/vil/pc/vil/primergy/building\\_blocks/rack\\_systems/pf\\_primecenter-cable\\_en.doc](http://extranet.fujitsu-siemens.com/vil/pc/vil/primergy/building_blocks/rack_systems/pf_primecenter-cable_en.doc)

### Rack integration order numbers

To integrate a server or I/O-Box into a Rack by Factory additional Order numbers are mandatory!

Integrate a M4000 or M5000 server into a Rack by Factory	RACK-SER2
Integrate a I/O-Box into a Rack by Factory	RACK-SER1

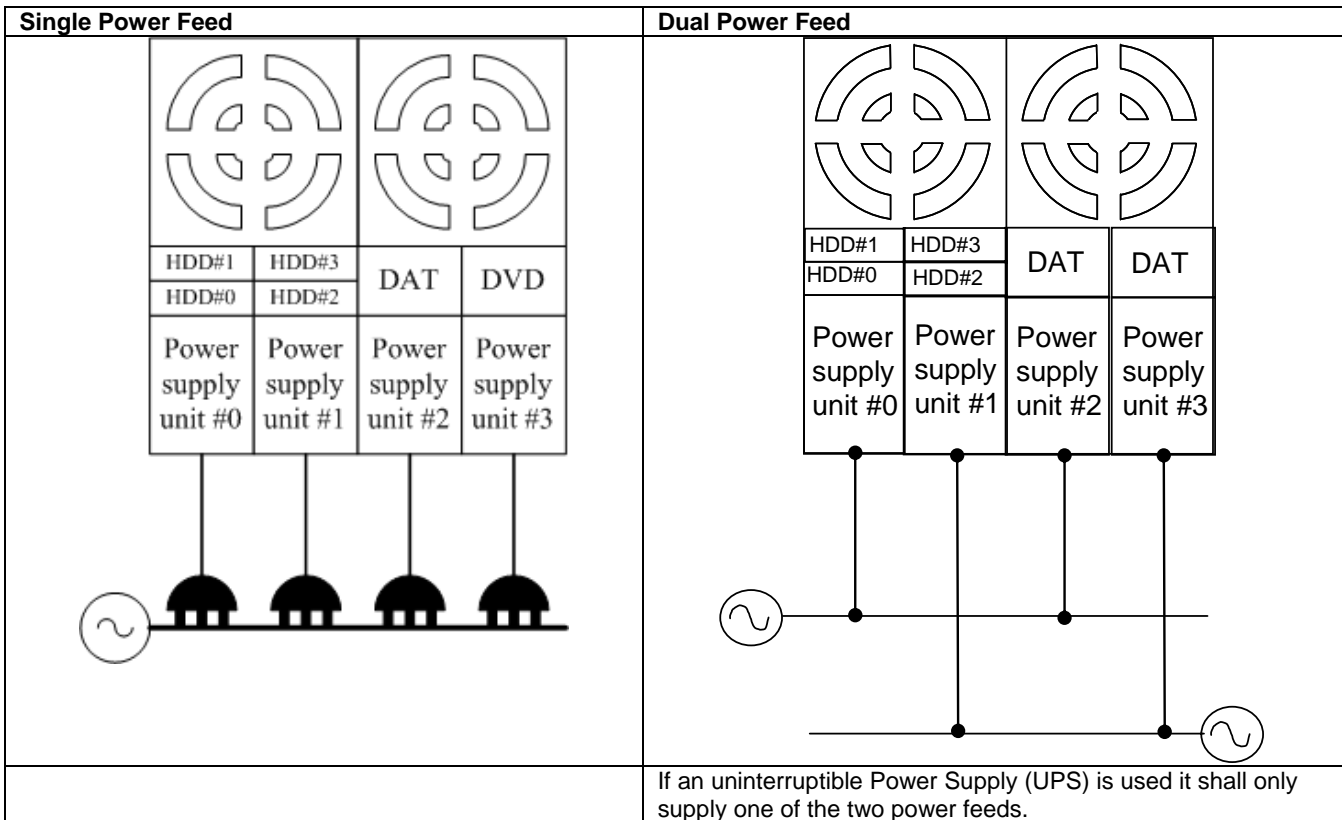
### Power Cords for PSU connection directly to Rack external Jacks:

Must only be ordered for direct Power connections outside of the Rack to a country specific jack.

Overview Numbers Power Cord:	Order	Description: It is recommended to order 1 Cord to each PSU:	Number of cables needed for M4000:	Number of cables needed for M5000:
SELX9P21U		MR AC Power Cord (for Continental Europe)	2	4

**Power supply unit and power supply connections**

SPARC® ENTERPRISE M5000 has 2+2 redundant power supply units (four in total).  
Connect the power supply units as follows.



**Solaris™ Operating System (OS) and other Software Product ID List**

The SPARC® Enterprise M5000 servers come with the Solaris 10 Operating System preinstalled on an HDD.

Order Numbers	Description:	Attention:
SOLZ9-100C9A7M	Solaris 10 OS Media kit Solaris 10 (latest release) DVD Media Kit. Multilingual, no hardcopy documentation, no license. Note: Must be ordered with each system if Premium Pack is not ordered!	One of these two positions must be ordered for each system!
U24529-C590A	Solaris 10 CD Set Premium Pack With additional SW-Components on the control DVD (ServerView Suite, etc.) This includes: SOLZ9-100C9A7M      Solaris 10 (latest release) DVD Media Kit U24529-C503A      control DVD Note: Must be ordered with each system if OS Media kit is not ordered!	
U24529-C592A	Solaris 10 Accessories Kit SPARC® Enterprise Server Low End and Midrange and ESF CD (Partition DR, SCF interface etc.) U24529-C502A	Must be ordered with each system!
X6099A	IPsec enabler CD for Crypto Accelerator 6000 Note: Can be ordered with Crypto Accelerator!	

## M5000 PCI Card Product ID List

### Ethernet Controller

Overview Order Numbers options:		PCI Bus type	for Factory Integration or X-option	Description	Max within a System	Max in an I/O-boat	Supported in I/O-Box	
X7281A-2		PCI-e	X-option	Dual Port Gb Ethernet MMF	8	2	Yes	
7281A-2			Fact.-Integrat.				Yes	
X7280A-2		PCI-e	X-option	Dual Port Gb Ethernet UTP	8	2	Yes	
7280A-2			Fact.-Integrat.				Yes	
X4447A-Z		PCI-e	X-option	Quad Giga Ethernet UTP Adapter	8 incl. IO-Boats	2	Yes	
4447A-Z			Fact.-Integrat.				Yes	
X1027A-Z		PCI-e	X-option	10Gb Ethernet Dual Port	Max 2 per Domain!	0	No	
1027A-Z			Fact.-Integrat.				No	
Options for 10Gb controller	X5558A	----	X-option	Transceiver (10GBASE-SR: 850nm, 300m, MMF).	In summery max. 2 per controller.	---	No	
	5558A-Z	----	Fact.-Integrat.				No	
	X5560A-Z	----	X-option	Transceiver (10GBASE-LR: 1310nm, 10km, SMF).			---	No
	5560A-Z	----	Fact.-Integrat.					No

### Serial Interface RS232 Controller

Overview Order Numbers options:		PCI Bus type:	for Factory Integration or X-option	Description	Max within a System	Max in an I/O-boat	Supported in I/O-Box
X2156A-2		PCI	X-option	Serial Asynchronous Interface (SAI/P) adapter 3.0	2	0	No
2156A-2			Fact.-Integrat.				No

### Cryptographic Host Bus Adapters

Overview Order Numbers options:		PCI Bus type:	for Factory Integration or X-option	Description	Max within a System	Max in an I/O-boat	remarks
X6000A		PCI-e	X-option	Crypto Accelerator 6000	2	0	
6000A			Fact.-Integrat.				

## Fibre Channel Host Bus Adapters

Overview Order Numbers options:	PCI Bus type:	for Factory Integration or X-option	Description	Max within a System	Max in an I/O-boat	Supported in I/O-Box
SG-XPCIE2FC-QF4	PCI-e	X-option	Dual 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	8	6	Yes
SG-PCIE2FC-QF4		Fact.-Integrat.				Yes
SG-XPCIE2FC-EM4	PCI-e	X-option	Dual 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	8	6	Yes
SG-PCIE2FC-EM4		Fact.-Integrat.				Yes
SG-XPCIE1FC-QF4	PCI-e	X-option	Single 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	8	6	Yes
SG-PCIE1FC-QF4		Fact.-Integrat.				Yes
SG-XPCIE1FC-EM4	PCI-e	X-option	Single 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	8	6	Yes
SG-PCIE1FC-EM4		Fact.-Integrat.				Yes
SG-XPCI2FC-QF4	PCI-X	X-option	Dual 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	2	----	No
SG-PCI2FC-QF4		Fact.-Integrat.				No
SG-XPCI2FC-EM4-Z	PCI-X	X-option	Dual 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	2	----	No
SG-PCI2FC-EM4-Z		Fact.-Integrat.				No
SG-XPCI1FC-QF4	PCI-X	X-option	Single 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	2	----	No
SG-PCI1FC-QF4		Fact.-Integrat.				No
SG-XPCI1FC-EM4-Z	PCI-X	X-option	Single 4Gb Fiber Channel Network Adapter, RoHS 6 compliant	2	----	No
SG-PCI1FC-EM4-Z		Fact.-Integrat.				No

## SCSI Host Bus Adapters

Overview Order Numbers options:	PCI Bus type	for Factory Integration or X-option	Description	Max within a System	Max in an I/O-boat	Supported in I/O-Box
SG-XPCIE2SCSIU320Z	PCI-e	X-option	PCI-E Dual channel Ultra320 low voltage differential SCSI host bus adapter includes standard and low profile brackets. RoHS 6 compliant	6	2	Yes
SG-PCIE2SCSIU320Z		Fact.-Integrat.				Yes

## Note:

- SCSI Controller SG-(X)PCIE2SCSIU320Z using Solaris 10 Update 3 can only be placed in PCI-express slot #2, #3 or #4 from both IOUs, not in PCI-express slot #1 nor in I/O-Box which is connected to this slot! Using Solaris 10 Update 4 or higher versions this SCSI-Controller is also allowed in PCI-express Slot #1, see table above.

### Console Connection

For APL a personal computer (PC) or workstation is required for system control and maintenance work. This console must be setup prior to installation of APL.  
The XSCF is accessed using this console. The console ports of each partition are accessed via XSCF. XSCF and the console need to be connected via LAN.  
If you forget the XSCF-sign on password, you will need to connect to XSCF via RS-232C for recovery.

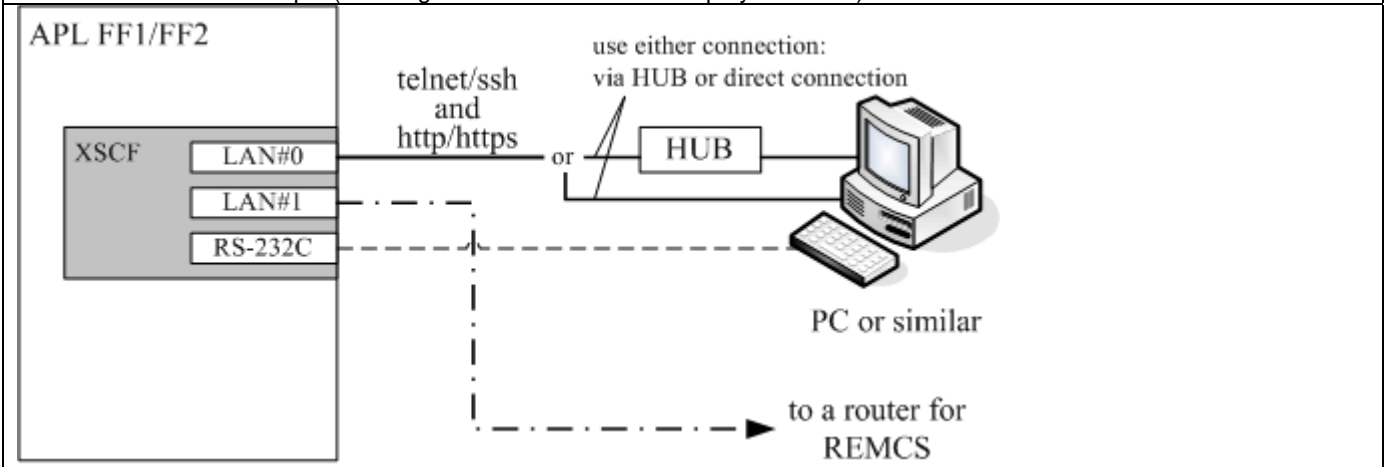
The customers console terminal should meet the following conditions.

- https (or http) and ssh (or telnet) available (for details, see the following specifications).
- The terminal needs to be placed within 15 m from the server.
- A maintenance account (account for field engineer privileges) for field engineers set up in advance. (For details on account creation, see "eXtended System Control Facility User's Guide".)

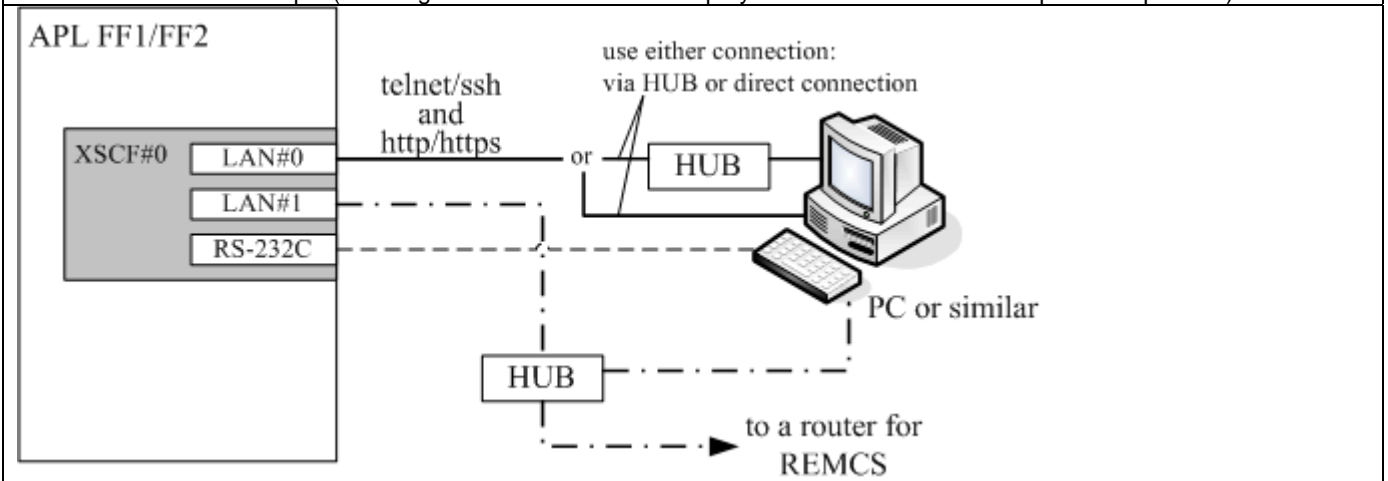
Where the customer has no prepared terminal, or the field engineer cannot use the terminal prepared by the customer, approval to use the field engineer's own PC should be gained from the customer.

Field engineers can connect their own PC to the XSCF via XSCF-LAN or RS-232C. (XSCF-LAN is used as standard. However, in special cases, if XSCF-LAN is not available or the XSCF-sign on password needs initialization, RS-232C is used.)

Console connection example (field engineer uses a terminal setup by customer)

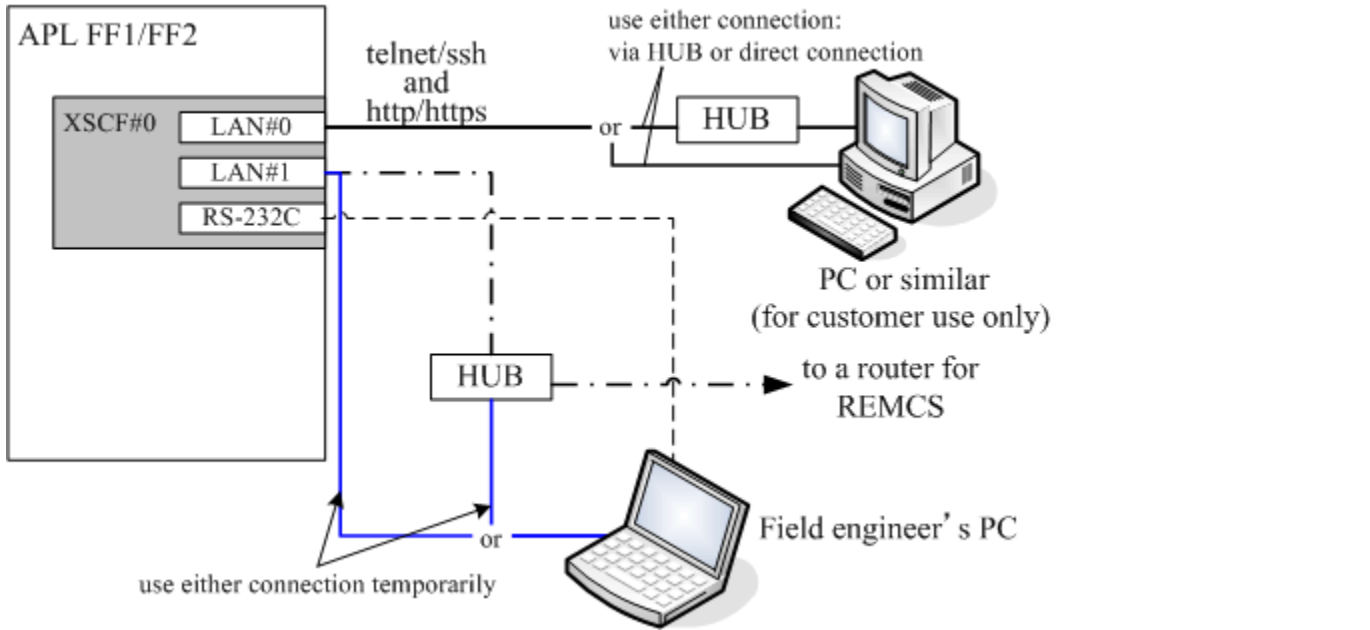


Console connection example (field engineer uses a terminal setup by customer and the console path is duplicated)



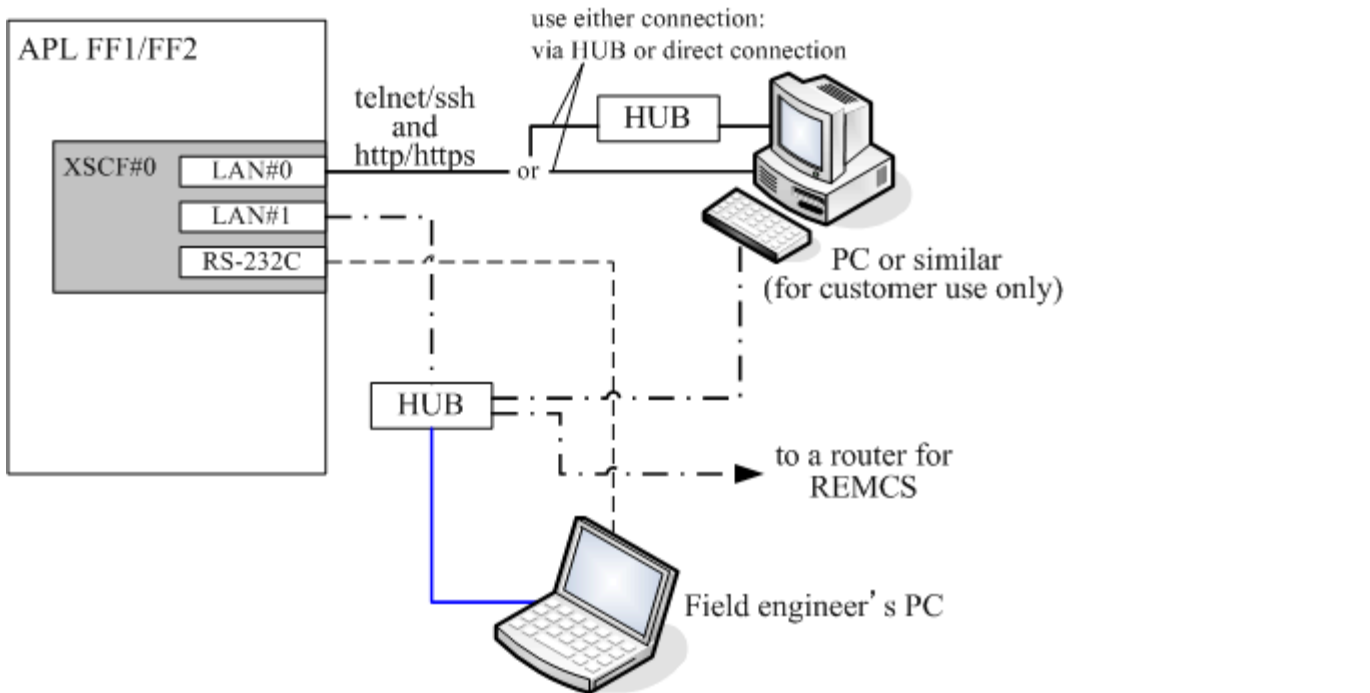
Note: For the HUB in the pictures our LAN Switch D:GP70F-AL21 can be ordered.

Console connection example (Field engineer connects temporarily a PC via LAN (shown as blue line) or RS-232C (shown as dotted line) as required to provide maintenance)



Note: For the HUB in the picture our LAN Switch D:GP70F-AL21 can be ordered.

Console connection example (the console path is duplicated. Field engineer connects temporarily a PC via LAN (shown as blue line) or RS-232C (shown as dotted line) as required to provide maintenance)



Note: For the HUB in the picture our LAN Switch D:GP70F-AL21 can be ordered.



**Specifications for the PC (or the workstation, etc.)**

	Description	Remarks
CPU	Pentium3 1 GHz or greater SPARC®	Equivalent CPUs i.e. AMD are suitable.
Memory	512 MB or greater	
OS	Windows XP Windows2000 RedHat Linux Solaris	One of the OS listed on the left is required.
I/O	CD-ROM/DVD-ROM (either internal or external device is available) LAN (1000Base-T, 100Base-TX, or 10Base-T) RS-232C (not necessarily required)	
Browser	Microsoft (R) Internet Explorer 6.0 or later Netscape Navigator (TM) 7.0 or later Mozilla 1.7 or later	One of the browsers listed on the left is required.
Terminal software (SSH)	Solaris Secure Shell Open SSH Other terminal software with equivalent function	One of the software items listed on the left is required to use SSH via LAN
Terminal software (RS-232C)	Hyper terminal Other terminal software with equivalent function	One of the software items on the left is required to use RS-232C connection

Connection type	Cable type	Number of cables used	Remarks	
LAN	via hub / switch D:GP70F-AL21	twisted-pair cable (category 5 UTP cable) TPCBL-B005	duplexed XSCF-LAN: 3 simplex LAN: 2	Purchased separately
	direct connection	Fast Ethernet direct cable: DCBL-FEA05	simplex LAN: 1	Purchased separately
RS-232C (not necessarily required)	RJ45 - DSUB9 pin, inch screw, female: DCBL-RSD05	1	Attached to the server	

\* Before ordering cables check the product ID and length for suitability of configuration.

**Ethernet Cables****Cables for Ethernet 1000 Base TX**

Product Number	Description	Remarks
S26361-F3417-E500	UTP cat 5 enhanced, customized length	<b>Cable only for Rack internal use if both targets are in a common rack!</b> <b>Please order "Factory integration" !</b> UTP category 5 enhanced patch cable for Gbit Ethernet (1000Base-T) to connect controllers with a hub or switch.
S26361-F3417-L505	UTP cat 5 enhanced, 05m	UTP category 5 enhanced patch cable for Gbit Ethernet (1000Base-T) to connect controllers with a hub or switch.
S26361-F3417-L510	UTP cat 5 enhanced, 10m	
S26361-F3417-L515	UTP cat 5 enhanced, 15m	
S26361-F3842-L5	UTP cat 5 enhanced IC-cable, 5m Lose	UTP category 5 enhanced crossover cable for Gbit Ethernet (1000Base-T) to make direct connection between Ethernet controllers in a two node configuration
S26361-F3842-E5	UTP cat 5 enhanced IC-cable, 5m Verbau	

**Cables for Ethernet 1000 Base SX**

Please buy optical cables locally.

## Partitioning

SPARC® ENTERPRISE M5000 supports partitioning in which a single server can be divided into multiple independent systems.

- Partitioning creates multiple independent systems which are called partitions or domains.
- The basic hardware resource required for partitioning is a Physical System Board (hereafter referred to as PSB). A PSB consists of a motherboard with or without connection to an IOU.
- A PSB can logically be divided into four parts. In this case it is called a Quad-XSB.
- A PSB without such a division is called a Uni-XSB.
- The physical unit configuration of each divided PSB part is called eXtended System Board (XSB).
- Partitions can be configured to form a domain using any combination of XSBs. XSBs divided with Uni-XSB and Quad-XSB can be mixed together within one domain.
- The XSCF is used to configure a partition and specify the PSB division type.
- Up to 4 partitions are supported.
- A minimum of one system hard disk drive per partition is necessary as a boot device.

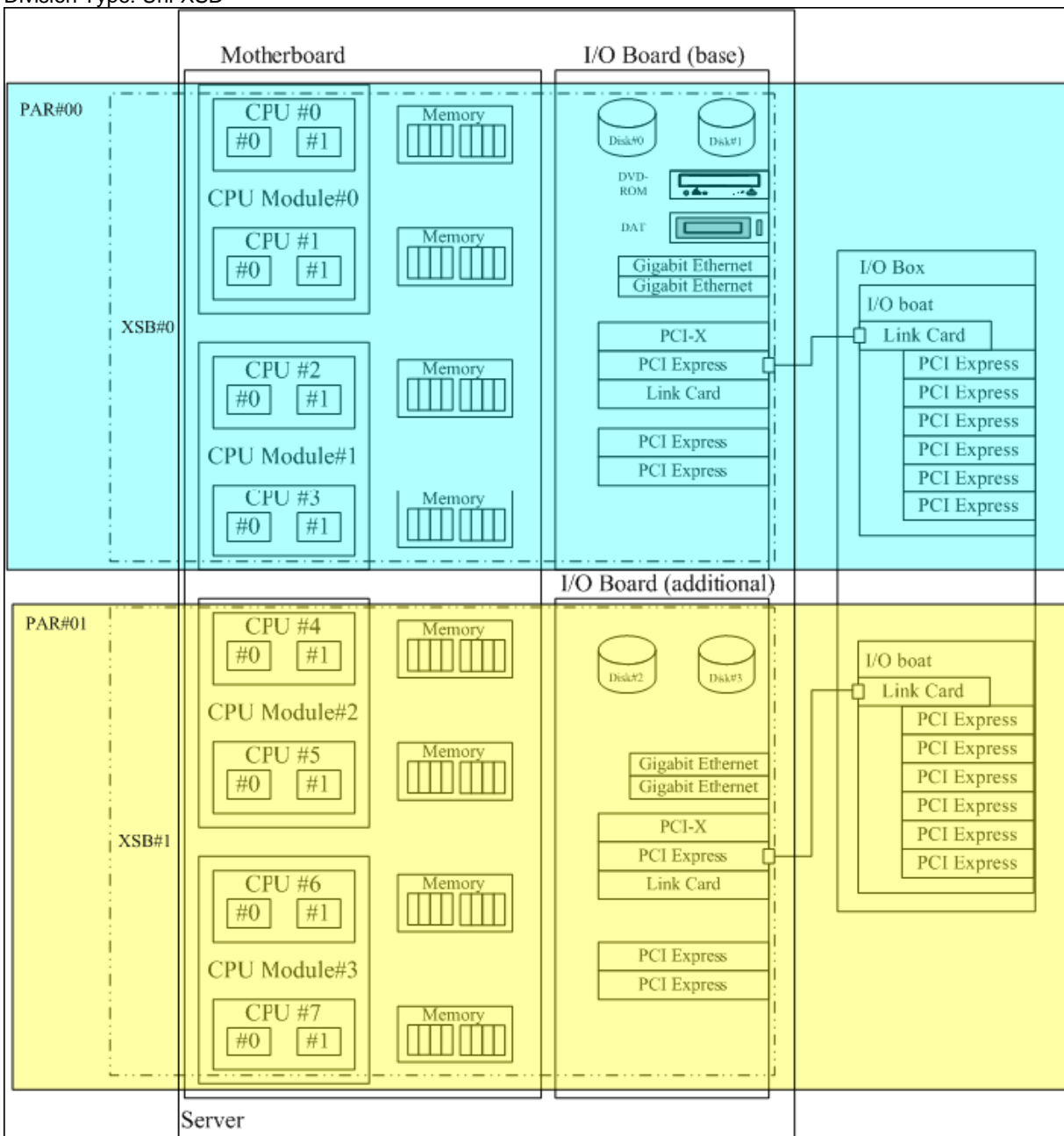
### PSB Division Types:

#### 1) Uni-XSB

The motherboard is divided into two physical system boards (PSB). Each PSB represents an own logical system in UNI-XSB format. The entire motherboard cannot be used as a single PSB.

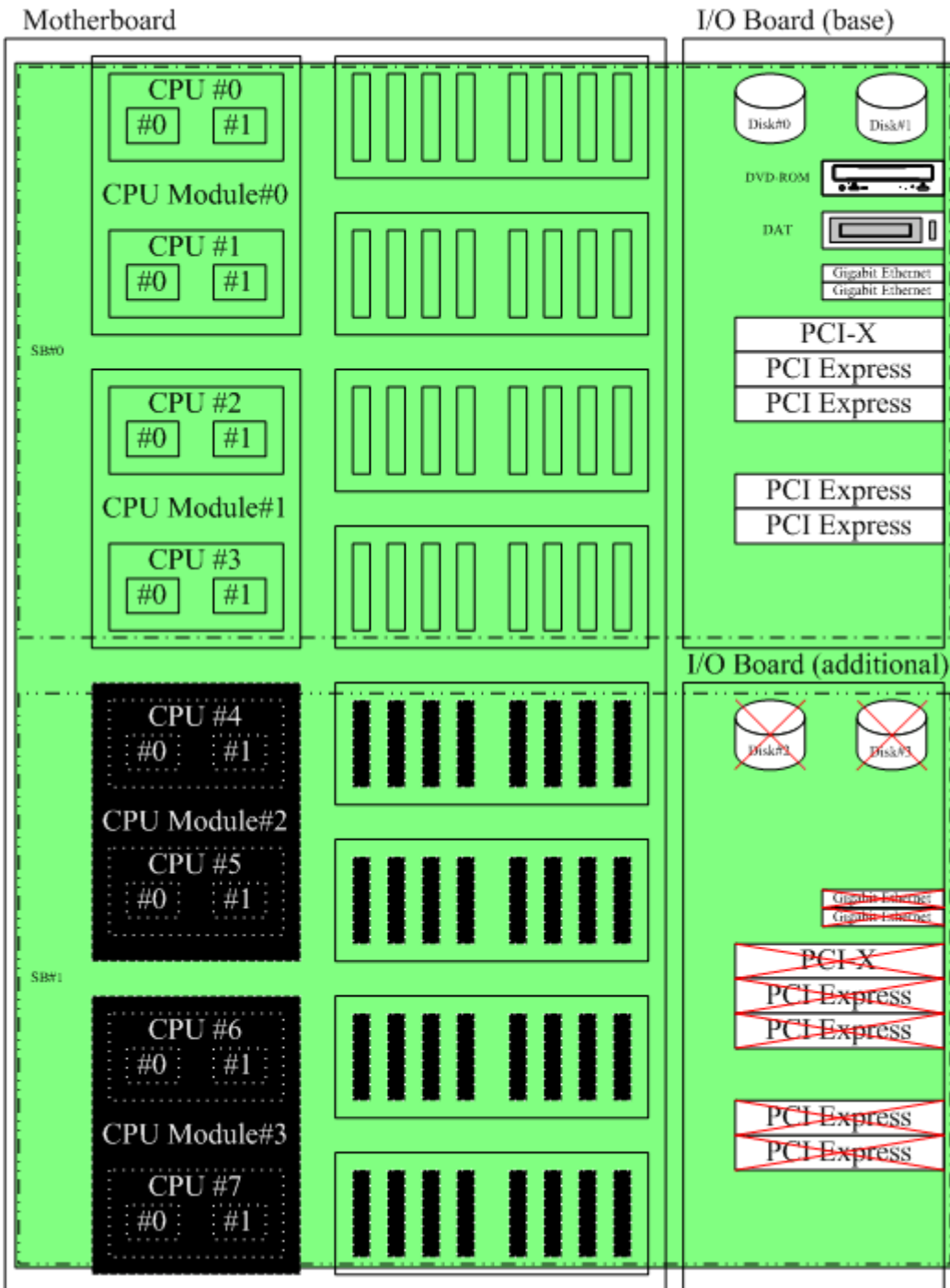
Uni-XSB is equivalent to the PSB definition for PRIMEPOWER.

Division Type: Uni-XSB



The two PSBs are not divided and used as two logical system boards (SB). CPU chips, memory, PCI slots, hard disk drives assigned to XSB are predetermined. Mount as a minimum one CPU module and two MEM modules per operating XSB.

If only one partition is configured with both PSBs in Uni-XSB mode but no CPU- and MEM-modules are mounted on PSB#1, then HDDs and PCI slots on the additional I/O board cannot be used (Areas shaded black in the figure below are not equipped with CPU- and MEM-modules).

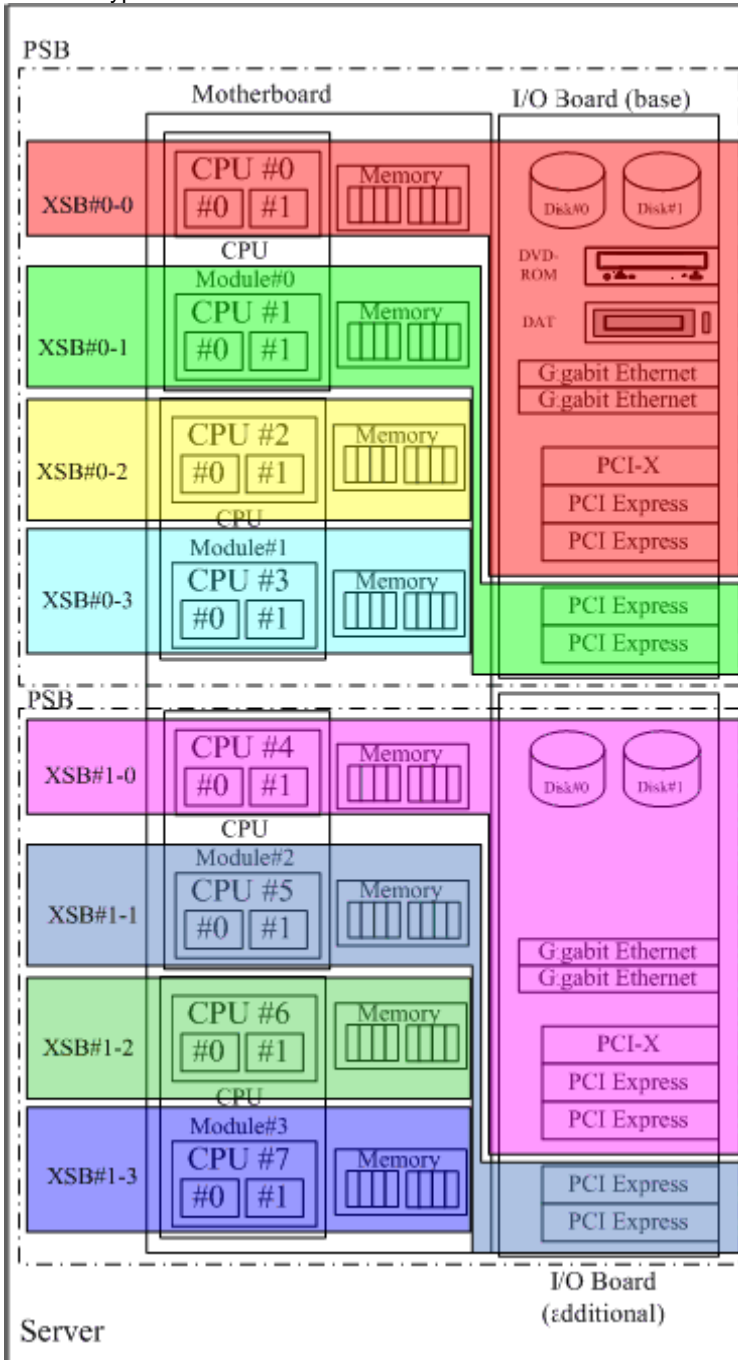


2) Quad XSB

Because Quad-XSB allows to configure several partitions in units of individual CPU chips (two cores) it is the optimized way to create small partitions.

Quad-XSB is equivalent to the XSB definition for PRIMEPOWER.

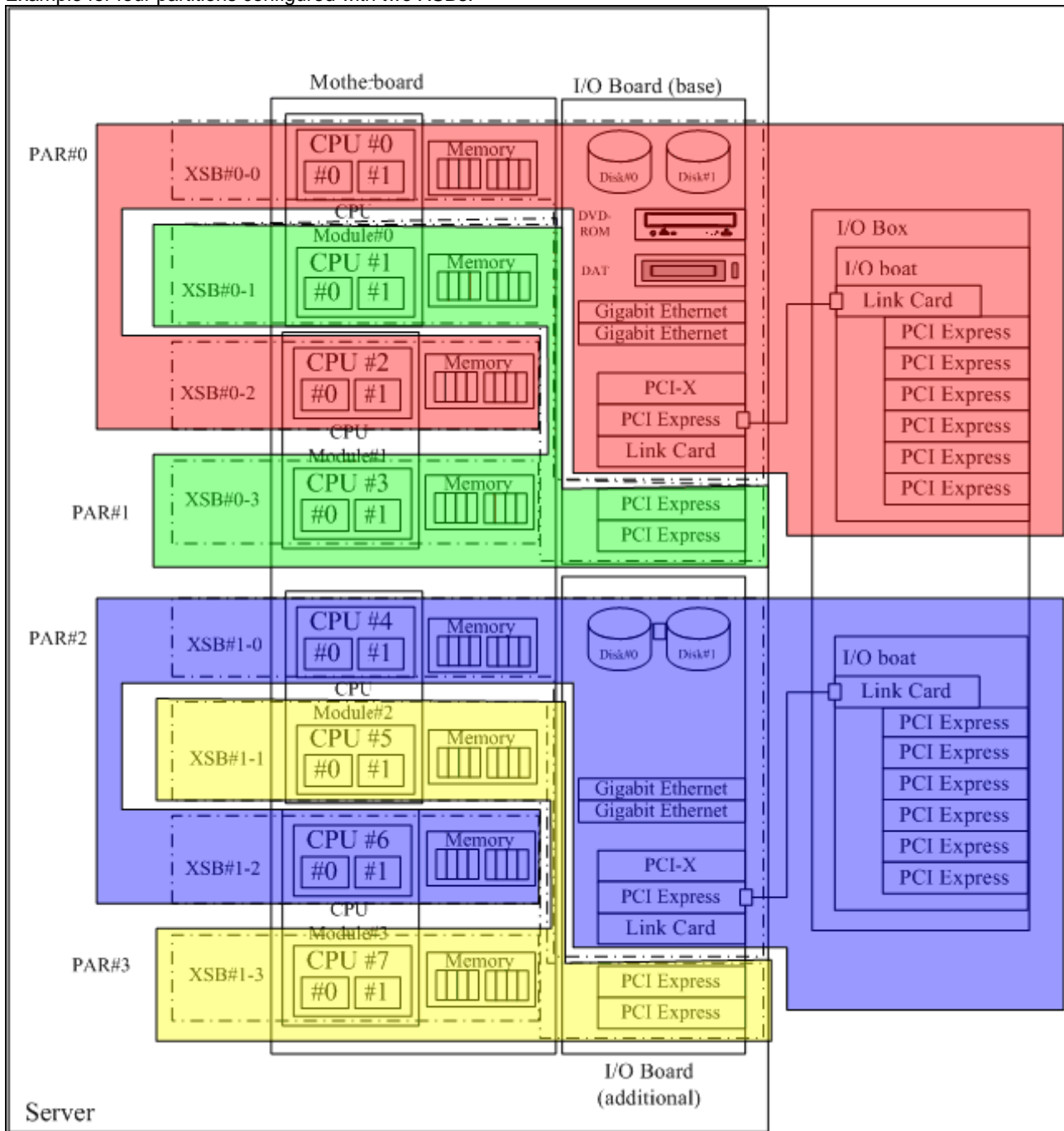
Division Type: Quad-XSB



PSB (consists of 1/2 motherboard and an I/O board) is divided into four partitions with 1 CPU chip and a set of memory (8 DIMMs) each. PSBs can be divided into XSBs (XSB#0-0, XSB#0-1, XSB#1-0, XSB#1-1) with connection to an I/O board and XSBs (XSB#0-2, XSB#0-3, XSB#1-2, XSB#1-3) without connection to an I/O board. CPU chips, memory, PCI slots and disks are permanently assigned to the XSBs as shown in the diagram above.

XSBs without connection to an I/O cannot be configured as an autonomous partition (refer to "8-4 Notes on Configurations" for details).

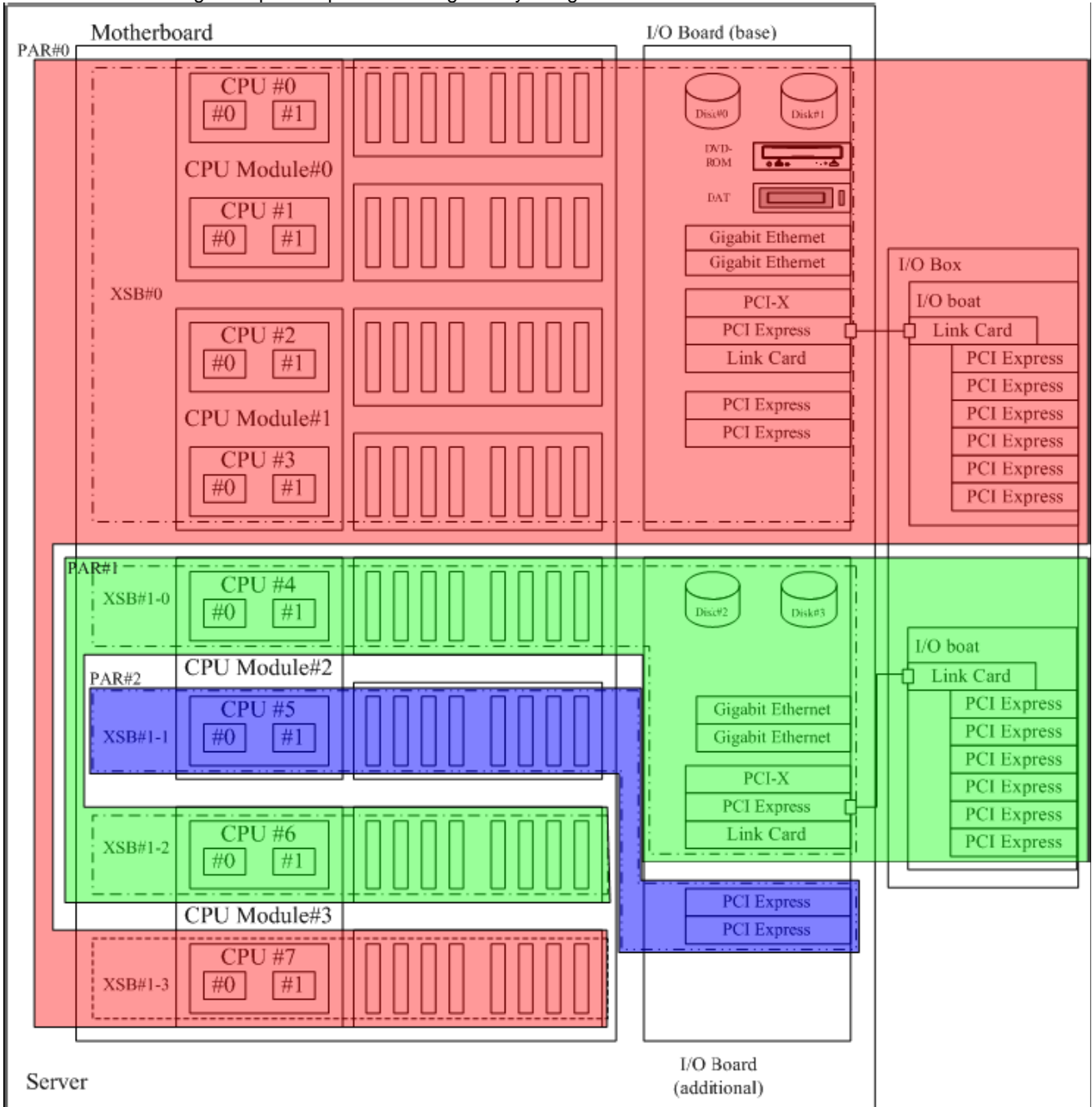
Example for four partitions configured with two XSBs.



**3) Combination of Uni-XSB and Quad-XSB**

PSBs divided into Quad-XSBs can be mixed together with Uni-XSB to configure a common partition. There is no difference in settings and conditions for partitions configured with Uni-XSB only or Quad-XSB only. This option is useful if only a partial memory mirroring within a certain partition is required but Uni-XSB-type XSB is too large to do so.

PAR#0 in the following example is a partition configured by using both Uni-XSB and Quad-XSB.

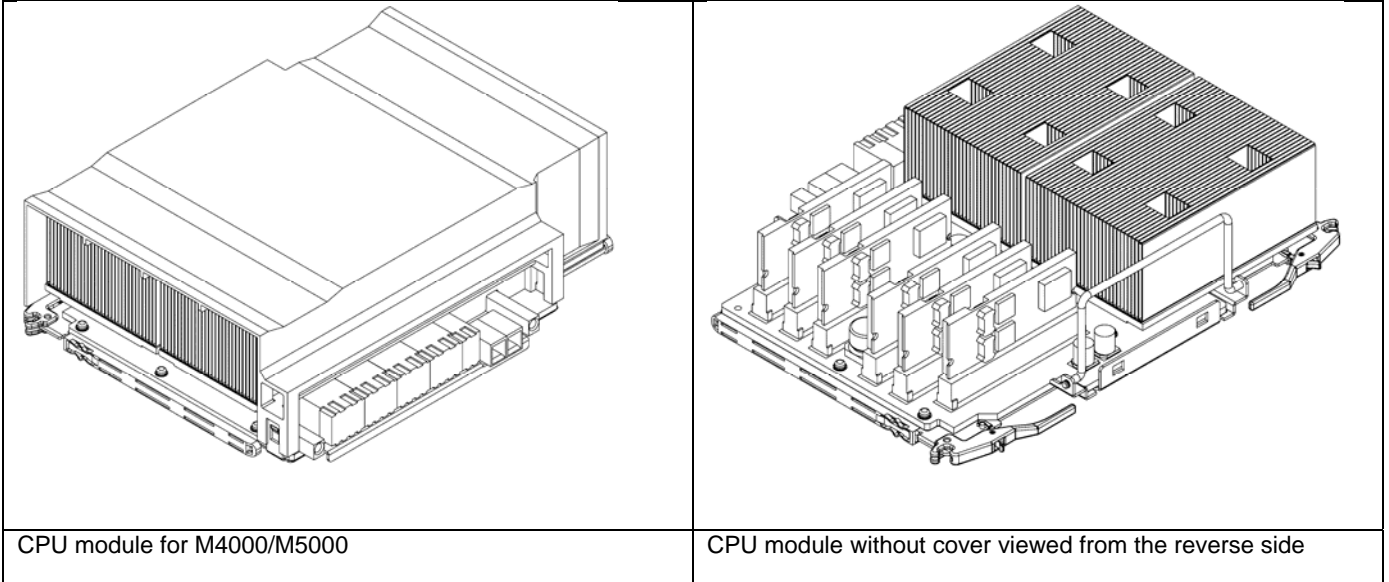


# CPU Module

## Product Overview

SPARC® ENTERPRISE M5000 servers use SPARC®64 V1 processors, which are multi-core/multi-threading CPUs. Each module contains two CPU chips (4 cores). Up to four CPU modules can be installed in SPARC® ENTERPRISE M5000.

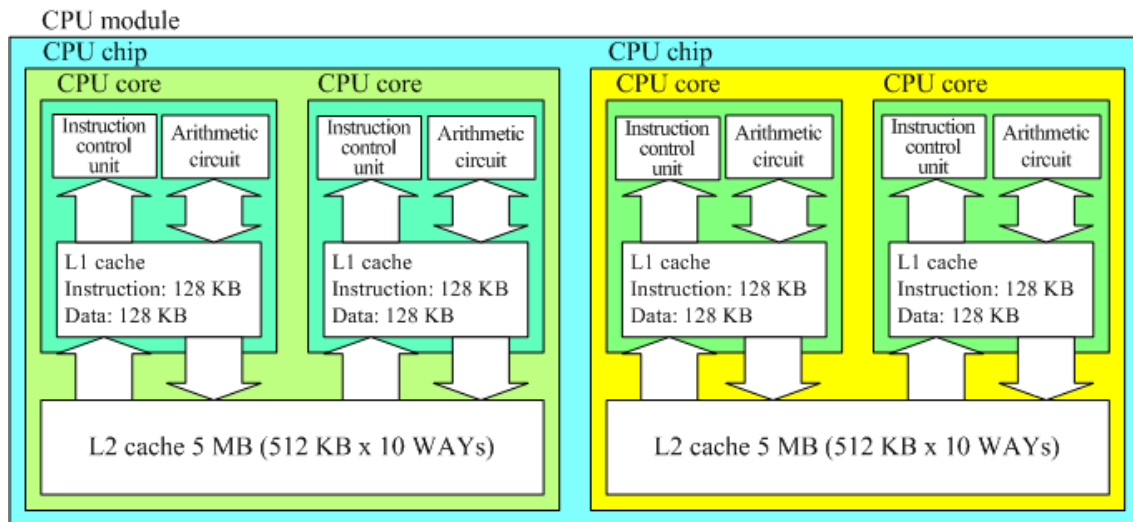
## Appearance



## Features

90 nm copper wiring CMOS technology is used for these processors to provide high performance while achieving low power consumption.

Two CPU cores are built on each CPU chip using CMP (Chip Multi-Processing) technology.



CMT (Chip Multi-Threading) technology provides multi-thread processing that virtualizes each CPU core as two threads.

The use of register renaming, out-of-order execution and non-blocking cache memory ensures high parallel-processing performance.

These modules offer mainframe levels of reliability inherited from SPARC®64 V.

- Data in both primary and secondary caches are protected by ECC (Error Checking and Correction).
- Registers and ALU are protected by parity.
- If an error occurs, the hardware re-executes the instruction that triggered the error. (Not all errors are covered by this feature.)
- If recoverable errors occur frequently in cache, hardware-set degrade mode is automatically invoked.

**Specifications**

Items		Specifications	Remarks
CPU	Type	SPARC® 64 VI	
	Frequency	2.15 GHz	
	Primary cache	Instructions: 128 KB data: 128 KB	per core
	Secondary cache	Both the instruction and data: 5 MB	per CPU (2 cores)
	Expansion unit	1 CPU module (2 CPU chips, 4 cores)	
Target servers		SPARC® ENTERPRISE M4000 SPARC® ENTERPRISE M5000	

**M5000 CPU Product ID List**

Marketing P/N	Option Description	Maximum Number Supported per System	Comments
Dual-processor Modules			
SELX1A1U	MR 2x 2.1GHz processor module. Without factory integration!	2 per M4000 4 per M5000	
SELY1A1U	MR 2x 2.1GHz processor module. Factory integration only!	2 per M4000 4 per M5000	

Purchase "Factory-installed modules" if you need the CPU modules installed and shipped inside the server.  
"Field expansion modules" are always shipped uninstalled even if they are purchased together with the server.

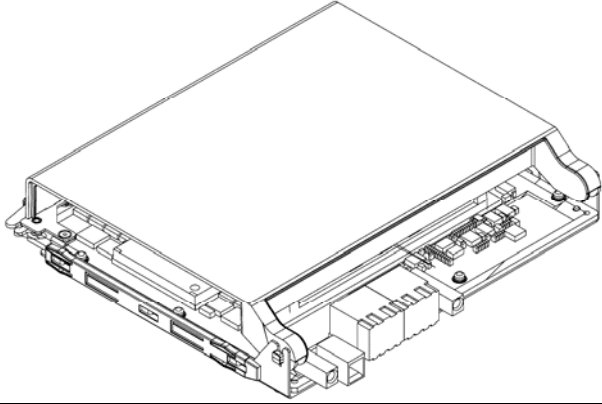
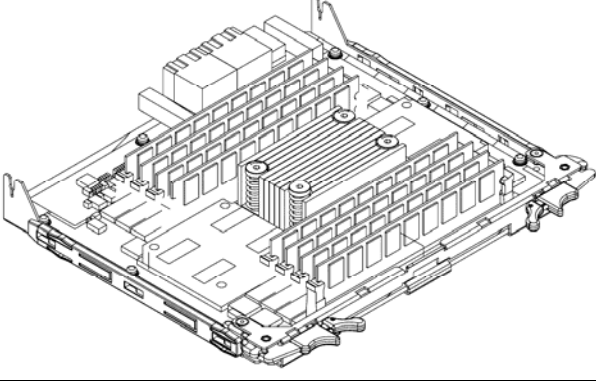


# Additional Memory Module

## Product Overview

SPARC® ENTERPRISE M5000 memory module is an expansion memory device consisting of memory DIMMs and a memory controller equipped on a board that can be plugged to the motherboard. There are 8 GB, 16 GB, and 32 GB additional memory module types with eight DIMMs each which can be added as a set. Mounting of additional memory modules must be performed under specific conditions. For details on how to add memory refer to “Conditions for Mounting Additional Memory”.

## Appearance

	
<p>Memory Module</p>	<p>Memory module without a cover (Memory module: 8 DIMMs are always mounted)</p>

## Features

- (1) 1 Gbit / 2 Gbit / 4 Gbit DDR2 SDRAM (Double Data Rate Synchronous Dynamic Random Access Memory) is used to provide high-speed access.
- (2) High-density DIMMs (Dual Inline Memory Module) are used to save space on the motherboard.
- (3) ECC (Error Checking and Correction) functions provide higher system reliability.
- (4) If a single memory chip on a DIMM fails completely, it is handled as a single-bit error. This technique drastically reduces the number of system shutdowns caused by memory failures.
- (5) Memory mirroring function enables continued operation even when an uncorrectable error (multi-bit error) occurs.
- (6) When memory failure is detected at initial diagnosis or during OS operation, Block Degradation or Area Degradation occurs. Because the area to be degraded is designed to be a controllable minimum area, other areas remain intact. Thus, operation can continue/resume using these areas. This minimizes the effects of failures.
- (7) MEM controller patrols memory during normal operation independently from the CPU and OS. This hardware can detect an error and degrade the area before either the OS or an application is affected. This procedure doesn't have any effect on other operations.

## M5000 Memory Product ID List

Marketing P/N	Option Description	Maximum Number Supported per System	Comments
SELX2A1U	8GB MR with server memory board and 8x 1GB DIMMs. Without factory integration!	4 per M4000 8 per M5000	
SELY2A1U	8GB MR with server memory board and 8x 1GB DIMMs . Factory integration only!	4 per M4000 8 per M5000	
SELX2B1U	16GB MR with server memory board and 8x 2GB DIMMs. Without factory integration!	4 per M4000 8 per M5000	
SELY2B1U	16GB MR with server memory board and 8x 2GB DIMMs. Factory integration only!	4 per M4000 8 per M5000	
SELX2C1U	32GB MR with server memory board and 8x 4GB DIMMs. Without factory integration!	4 per M4000 8 per M5000	
SELY2C1U	32GB MR with server memory board and 8x 4GB DIMMs. Factory integration only!	4 per M4000 8 per M5000	

Purchase “Factory integration only” modules if you need the memory modules installed and shipped inside the server. “Without factory integration” means modules are always shipped uninstalled even if they are ordered with the server.

### Notes on Memory ordering:

- Two sets of memory modules with the same size (16 DIMMs) must be mounted on a physical system board as a minimum. 8 DIMMs are always handled as one set.
- When adding memory, two sets of memory modules with the same size must be added at the same time. Memory can only be added in increments of 2x eight DIMMs. Only 2, 4, 6 or 8 Memory Modules are allowed.
- For mixing DIMMs with different sizes special conditions have to be noticed, see chapter "Mounting additional Memory with different sizes".
- If Memory Modules are installed on the second physical System Board a CPU-module on this PSB is mandatory and vice versa.
- If a second internal I/O-tray is installed, at least one CPU-module and two Memory modules on the second physical System Board are mandatory (see also Memory Exception rules).
- Min of 1 memory module per processor in Quad XSB Mode

Hint: When ordering 4Gb DIMMs the customer has to specify how FSC shall deal with the memory which comes with the base configuration. It can either be delivered in a separate package or placed in MEM slots which remain open.

### Memory Exception rules requires a "Request for Project Release":

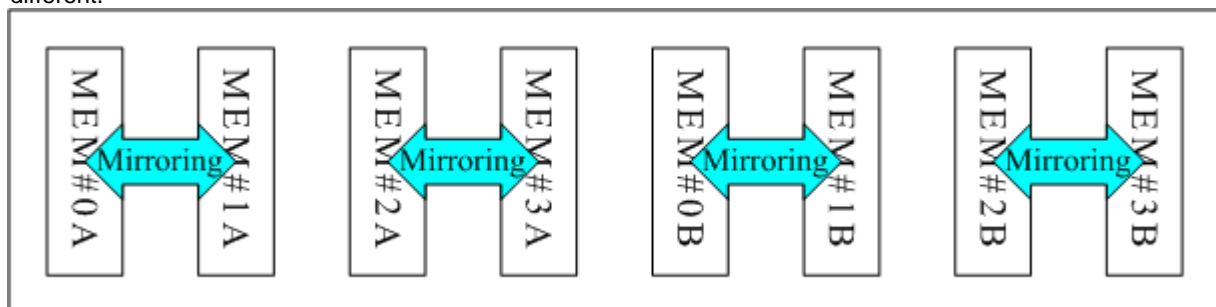
- To keep the initial costs low it is allowed as an exception to run a physical system board with only one MEM-module. This is allowed for PSB#0 or PSB#1 or both of them. This is meaningful in cases where a basic server configuration with only two MEM modules is ordered together with an additional 2<sup>nd</sup> I/O-tray. To get the 2<sup>nd</sup> I/O tray working you have to move a CPU module and a MEM module from the first PSB to the second PSB.
- PSBs with only one MEM module can only be configured in Uni-XSB mode, but not in Quad-XSB mode.
- If you run a PSB with only one MEM module you have to be aware of the risk in case:
  - Of uncorrectable memory errors. In such a case the partition will panic and will not be bootable again, until the memory fault is solved.
  - If reconfigured to quad-XSB the CPU module, which is placed in a XSB without memory, will be disabled.

### Memory Mirroring

SPARC® ENTERPRISE M5000 models provide hardware based memory mirroring to avert system downs even when multi-bit errors are detected.

#### Features:

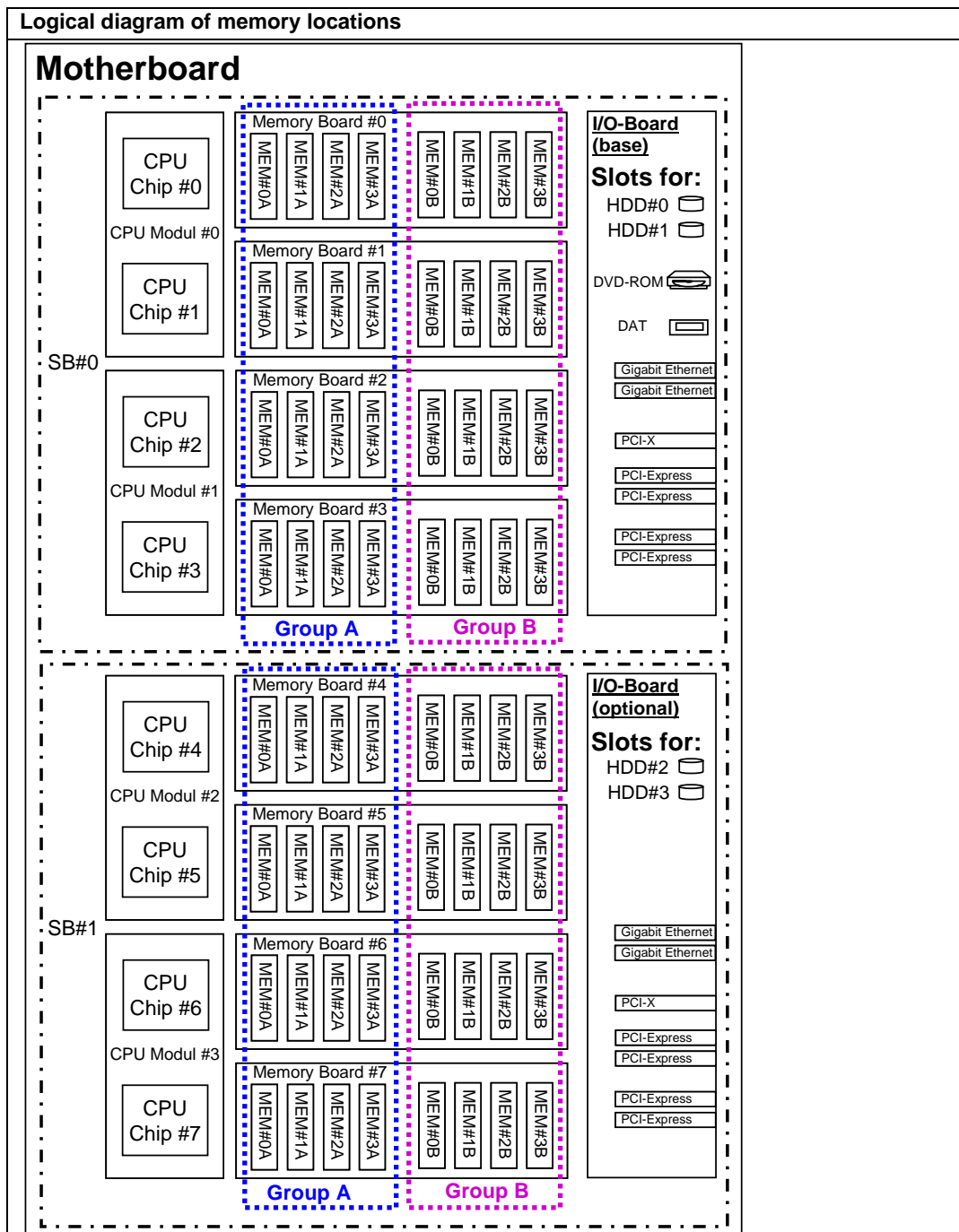
- Memory mirroring is available in both Uni-XSB and Quad-XSB configurations. In Quad-XSB configuration, however, mirroring should be configured in units of four XSBs (the same size as with Uni-XSB configuration). Mirroring cannot be configured using a single XSB.
- Mixed configurations of mirrored and unmirrored SB/XSB in one partition are supported (on M5000).
- Memory mirroring configuration is performed from the XSCF. For more information, refer to "eXtended System Control Facility User's Guide".
- When mirroring is configured, the available memory capacity on each SB/XSB one-half of the total size.
- Mirroring is done within a group using combinations as shown below. Thus, the memory size in Groups A and B can be different.



### Mounting additional Memory with different sizes

MEM in SPARC® Enterprise M5000 is organized on each SB separately in two groups:

- Max. 16 DIMMs mounted in MEM#xA slots at SB#0 defined as Group A of SB#0.
- Max. 16 DIMMs mounted in MEM#xB slots at SB#0 defined as Group B of SB#0.
- In Group B at SB #0, all DIMMs must have the same Capacity. In Group A at SB #0, all DIMMs must have the same Capacity and this Capacity must be equal or bigger than the DIMMs of Group B. This DIMM Mix within a SB is possible in Uni-XSB and Quad-XSB Mode.
- Max. 16 DIMMs mounted in MEM#xA slots at SB#1 defined as Group A of SB#1.
- Max. 16 DIMMs mounted in MEM#xB slots at SB#1 defined as Group B of SB#1.
- In Group B at SB #1, all DIMMs must have the same Capacity. In Group A at SB #1, all DIMMs must have the same Capacity and this Capacity must be equal or bigger than the DIMMs of Group B. This DIMM Mix within a SB is possible in Uni-XSB and Quad-XSB Mode.
- Memory configurations and arrangements on SB#0 and on SB#1 can be different.
- On each used SB a minimum of one CPU Module and two Memory Boards are necessary. The optional second I/O-Board also requires the minimum of CPU and Memory on SB#1.



### Mounting Conditions for Memory with different sizes

**Condition 1:**

To mix different DIMM types on a certain SB see chapter “Mounting additional Memory with different sizes”.

**Condition 2:**

Two sets of memory modules with the same size (16 DIMMs) must be mounted. When adding memory, two sets of memory modules with the same size must be added at the same time.

**Condition 3:**

When mounting DIMMs to a specific group, the memory size must be identical within this group. DIMMs of different memory sizes cannot be mounted within a group.

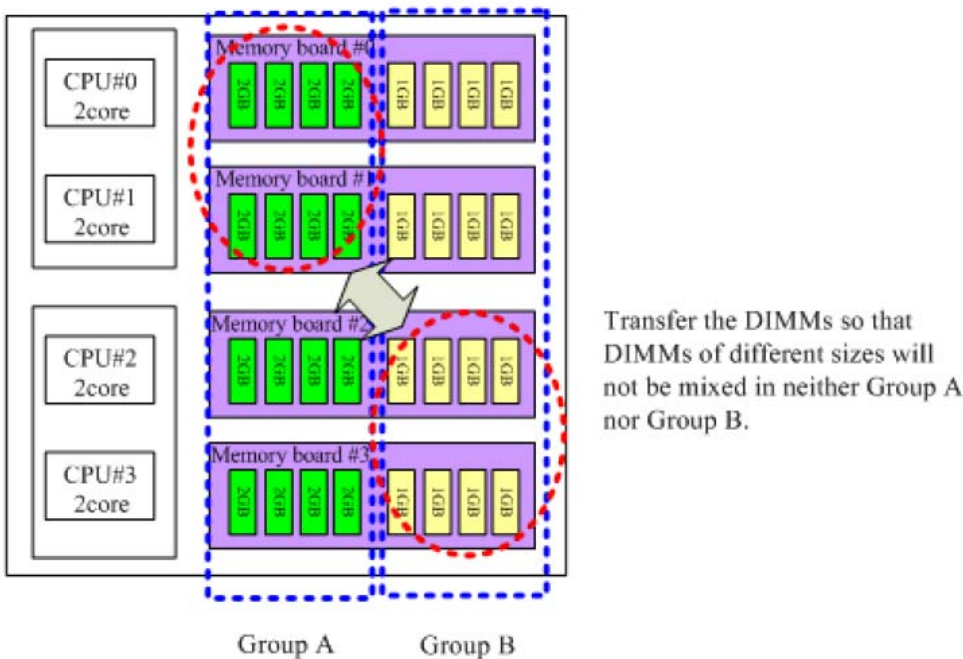
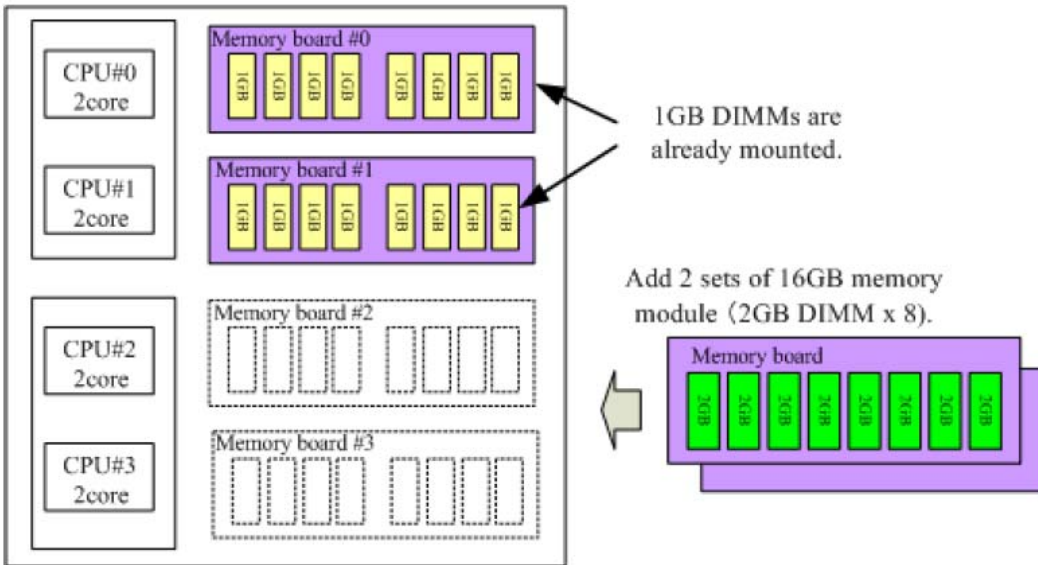
**Condition 4:**

Memory size in Group A must be greater than or equal to that in Group B.

These rules are true for mirrored and not mirrored memory configurations.

**When mounting additional memory with different memory sizes transfer already-mounted DIMMs as necessary and follow the above conditions.**

Example of Memory Expansion for SB#0



### Memory Interleaving

Memory interleaving is a technique that divides main memory into several blocks (WAYS) and accesses each WAY independently and in parallel to enable effective access to the contiguous area.

The size of one WAY is 64 bytes, which is the line size of cache memory.

SPARC® ENTERPRISE M4000 / M5000 perform memory interleaving in Group units as standard. The number of WAYS in each configuration is as follows.

Uni-XSB configuration (16 DIMMs of memory are mounted in Groups A and B)								
	WAY1	WAY2	WAY3	WAY4	WAY5	WAY6	WAY7	WAY8
Group A	8WAY							
Group B	8WAY							
Uni-XSB configuration (8 DIMMs of memory are mounted in Groups A and B)								
	WAY1	WAY2	WAY3	WAY4				
Group A	4WAY							
Group B	4WAY							
Quad-XSB configuration								
	WAY1	WAY2						
Group A	2WAY							
Group B	2WAY							

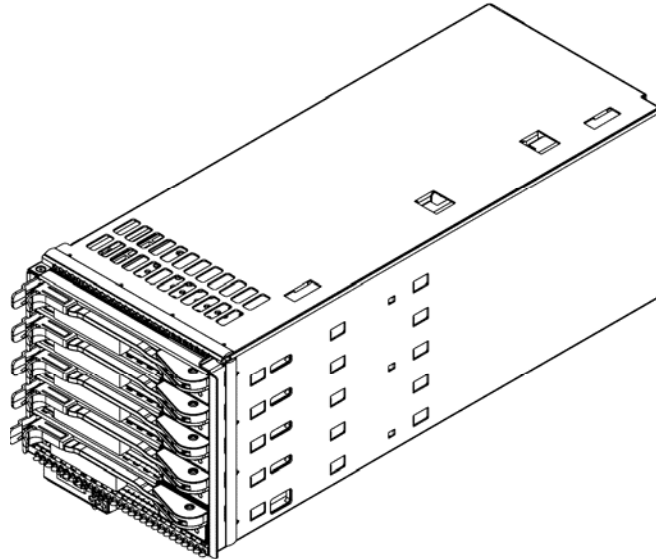
# I/O Board

(also called I/O tray or I/O Unit (IOU))

## Product Overview

The SPARC® ENTERPRISE M5000 basic configuration contains one I/O board. A second I/O board can be added to SPARC® ENTERPRISE M5000.

## Appearance



## Features

- The I/O board provides four PCI-Express slots and one PCI-X slot.
- The I/O board has two on-board Gigabit Ethernet<sup>1</sup> ports and SAS-connections to two hard disk drives.
- The first I/O board has a connection to the DVD-drive and to the optional internal DAT drive<sup>2</sup>.

## Specifications

Items	Specifications	Remarks
	Internal I/O Unit	Are in base unit as standard.
On-board I/O	2x 1000Base-T <sup>1</sup> ports	
Internal PCI slot	4 slots PCI-Express, each 8 lanes 1x PCI-X: 1 slot	
Maximum number of HDDs	Connection to 2 HDDs	
Internal optical drive <sup>2</sup>	Connection to 1x DVD drive (DVD-ROM: 8X, CD-ROM: 24X)	
Internal tape device <sup>2</sup>	Connection to 1x DAT72	

## M5000 second I/O Board Product ID List

Marketing P/N	Option Description	Maximum Number Supported per System	Comments
SEFX61U	MR I/O Tray (4 PCIe and 1 PCI-X slots) . Without factory integration!	Up to 1 per M5000	
SEFY61U	MR I/O Tray (4 PCIe and 1 PCI-X slots) . Factory integration only!	Up to 1 per M5000	

Note for chapter I/O Board

\*1: Notes on LAN connection

LAN ports on the I/O Board and on LAN PCI Express cards belonging to the same partition have the same MAC address by default. Therefore, do not connect them to the same subnet before you have changed the default MAC address. You can assign unique MAC addresses to respective LAN ports by changing the OBP environment variable "local-mac-address?" to "true".

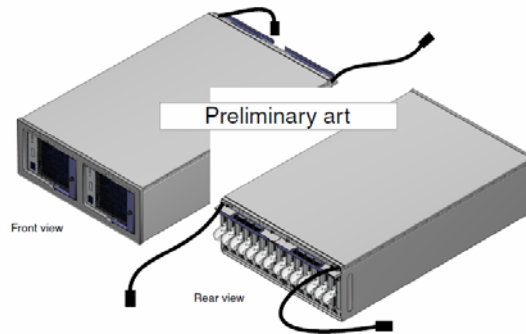
\*2: DVD-ROM drive and the internal DAT drive cannot be connected to the expansion (second) I/O board of the SPARC® ENTERPRISE M5000.

# I/O-BOX

## Product Overview

The External I/O Expansion Unit (hereafter referred to as I/O Box) is a rack-mountable expansion unit used to expand the server's I/O connectivity with up to 12 PCI Express or PCI-X slots. Each I/O-box can contain two External I/O kits (hereafter referred to as I/O boats) (giving 12 slots in total). Each I/O boat provides either six PCI Express or six PCI-X slots. To connect to the I/O boat insert a Link Card into a PCI Express slot on the server and connect them with a cable kit. Up to four I/O Boxes can be connected resulting in 48 external PCI slots for a M5000

## Appearance (provisional):



## Features

- Each I/O Box comes with one I/O boat for six PCI Express or six PCI-X slots as standard. By adding a second PCI Express or PCI-X I/O boat the I/O Box can provide a maximum of 12 slots.
- There are two kinds of expansion I/O boats; PCI Express and PCI-X. Mixed I/O boat configuration is supported.
- Both PCI Express and PCI-X slot types support PCI HotPlug for I/O cards.
- Hot replacement and hot system expansion for each I/O boat is also supported.
- Each I/O Box has 1+1 redundant power supply units and supports single or dual power feed.
- Hot replacement for each power supply unit is supported.
- The I/O Box can be mounted in a 19-inch rack (4U).

## Specifications

Items		Specifications		Remarks
Slot type, number	In base system	PCI Express: 6	PCI-X: 6	
	Maximum number	PCI Express: 12 or PCI Express: 6 and PCI-X: 6	PCI-X: 12 or PCI Express: 6 and PCI-X: 6	depending on the I/O boat types which are mounted
Redundant components		Power supply units, power system		
Hot replaceable components		PCI cards, I/O boats, power supply units		
Target servers		M4000/ M5000		

## IO boat PCI Slot Specifications

### I/O boat for PCI Express

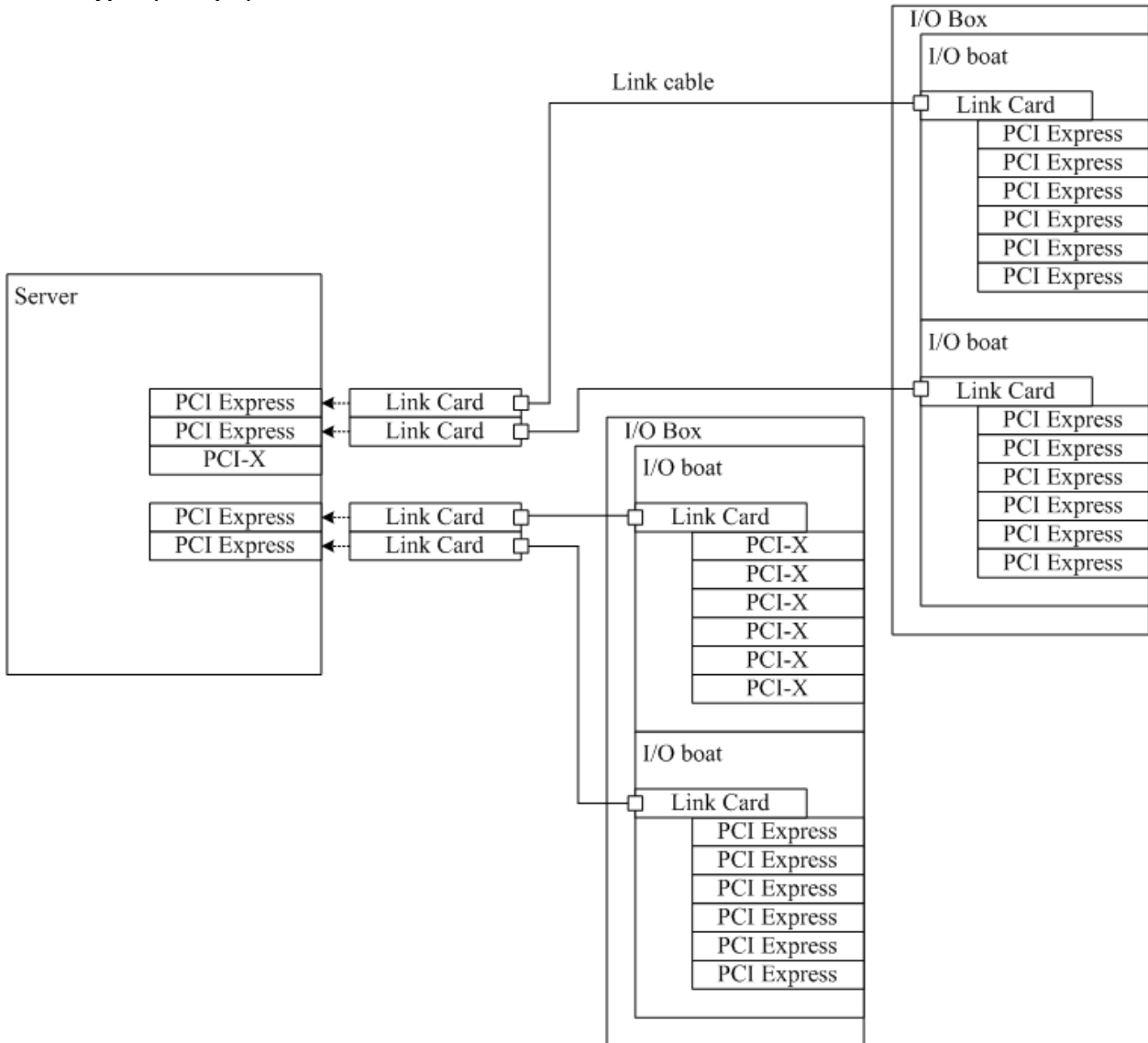
PCI Bus	Slot No.	No. of Lanes	Card Size
	LINK0	for exclusive use with a Link Card	
PCI Express	PCIE1	8	L
	PCIE2	8	L
	PCIE3	8	L
	PCIE4	8	L
	PCIE5	8	L
	PCIE6	8	L

### I/O boat for PCI-X

PCI Bus	Slot No.	Bus Width	Clock Rate	Input Voltage	Card Size
	LINK0	for exclusive use with a Link Card			
PCI-X	PCIX1	64/32 bit	133 MHz	3.3 V/Universal	L
	PCIX2	64/32 bit	133 MHz	3.3 V/Universal	L
	PCIX3	64/32 bit	133 MHz	3.3 V/Universal	L
	PCIX4	64/32 bit	133 MHz	3.3 V/Universal	L
	PCIX5	64/32 bit	133 MHz	3.3 V/Universal	L
	PCIX6	64/32 bit	133 MHz	3.3 V/Universal	L

- PCI Bus: indicates the types of I/O boat.
- LINK0: indicates slots where Link Cards, separately purchased PCI cards for connecting the server and the I/O Box, are mounted.
- No. of Lanes: indicates the width of PCI Express slot lane and shows eight lanes are supported.
- Bus Width: shows PCI slots support a 64-bit width, and any PCI card with a 64-bit or 32-bit width can be used.
- Clock Rate: indicates operating frequencies supported by each PCI slot. When a 133 MHz operable PCI card is installed, the clock rate becomes 133 MHz.
- Input Voltage: indicates the voltage levels of PCI cards that can operate in the slot. 3.3 V PCI cards and universal PCI cards (PCI cards that can work at either 3.3 V or 5 V) can be mounted in any slot. PCI cards that only work in 5 V slots cannot be used.
- Card Size: S indicates short length PCI cards and L indicates long length PCI cards can be installed.

**Connection Types (example)**



Connection between server and I/O Box is realized by Fibre or Copper Link Card Kit (Link Card) and a dedicated cable set (Link cable). Insert the Link Card in a PCI Express slot on the server. Cascade connection of I/O boats is not supported.

**Expansion**

M5000: Up to 4 external I/O Boxes with 2 boats each are connectable (second internal IOU must be installed for third and fourth external I/O-Box). Each I/O boat is connected directly to the server and occupies one PCI-express slot in internal IOU.



## M5000 external I/O-Box Product ID List

Marketing P/N	Option Description	Comments
SENX8BE1S	PCI-Express External I/O Expansion Unit, w. 2x PSUs, w 1 PCI-E Boat, ROHS-6 <b>If "Factory integration" will be accomplished or not depends on order sequencing!</b>	FSC Ext I/O Exp Unit, 1 PCI-E
SENX8BX1S	PCI-X External I/O Expansion Unit, w. 2x PSUs, w 1 PCI-X Boat, ROHS-6 Without factory integration! <b>If "Factory integration" will be accomplished or not depends on order sequencing!</b> <b>Current Status: For order of PCI-X I/O-Box a Request for Special Release is necessary!</b>	FSC Ext I/O Exp Unit, 1 PCI-X <b>currently without Controller support!</b>
SENY8TE1U	PCI-Express IO-Boat for External I/O Expansion Unit, ROHS-6 Factory integration only!	PCI-E IO-Boat for I/O Exp Unit
SENX8TE1U	PCI-Express IO-Boat for External I/O Expansion Unit, ROHS-6 Without factory integration!	PCI-E IO-Boat for I/O Exp Unit
SENY8TX1U	PCI-X IO-Boat for External I/O Expansion Unit, ROHS-6 Factory integration only! <b>Current Status: For order of PCI-X I/O-Boat a Request for Special Release is necessary!</b>	PCI-X IO-Boat for I/O Exp Unit <b>currently without Controller support!</b>
SENX8TX1U	PCI-X IO-Boat for External I/O Expansion Unit, ROHS-6 Without factory integration! <b>Current Status: For order of PCI-X I/O-Boat a Request for Special Release is necessary!</b>	PCI-X IO-Boat for I/O Exp Unit <b>currently without Controller support!</b>
SELY8LK1U	1x copper Link card Kit (2 boards + 2 x 4M copper cables) for External I/O Expansion Unit. Factory integration only!	copper Link Card Kit, 4 M
SELX8LK1U	1x copper Link card Kit (2 boards + 2 x 4M copper cables) for External I/O Expansion Unit. Without factory integration!	copper Link Card Kit, 4 M
SENY8LK2U	1x Optical Link card Kit (2 boards + 2 10M optical cables) for External I/O Expansion Unit. Factory integration only!	Optical Link Card Kit, 10 M
SENX8LK2U	1x Optical Link card Kit (2 boards + 2 10M optical cables) for External I/O Expansion Unit. Without factory integration!	Optical Link Card Kit, 10 M
SENY8LK3U	1x Optical Link card Kit (2 boards + 2 x 25M optical cables) for External I/O Expansion Unit. Factory integration only!	Optical Link Card Kit, 25 M
SENX8LK3U	1x Optical Link card Kit (2 boards + 2 x 25M optical cables) for External I/O Expansion Unit. Without factory integration!	Optical Link Card Kit, 25 M
SENX8FC1U	1x Optical Link Cable Set (10m optical cable) for External I/O Expansion Unit. Without factory integration!	Optical Link Cable only, 10m
SENX8FC2U	1x Optical Link Cable Set (25m optical cable) for External I/O Expansion Unit. Without factory integration!	Optical Link Cable only, 25m

## Notes:

- To connect to a server each I/O boat requires its own Link Card Kit. The Link Card Kits are not included in the basic I/O Box configuration and must be purchased separately.
- It is not supported to connect the two IO boats within one I/O-Box to different servers. If two I/O boats are equipped they have to be connected to the same server.

## External storage units for M5000

### External storage units for HDDs or MTC drives (differential SCSI)

#### DN413 disk node for high performance HDD

Overall view disk nodes (new generation)	
Disk node	DN413
Drive interface	U320 SCSI Wide (LVD)
Node interface	U320 SCSI Wide (LVD)
Capacity per disk	73 GByte, 146 GByte, 300 GByte
Maximum capacity / disk node	2x (7x300) = 4.2 TByte
Cabinet type	19" rack-mount (3 HU)
Redundant components	Fan (std), PSU/DPF (option)
Controller to connect (HBA)	SG-(X)PCIE2SCSIU320Z
Throughput	2x 320 MByte/s
Maximum cable length	10 m
Max. number of DN413 per dual port HBA	1x DN413 = 4 TByte
RAID level	0, 1 by SW
Cluster	NO
Required additional components	1 - 2 cables, 1 – 2 HBA, 1 – 14 Disk's (FP81, FP84 or FP85, FP86) Rack for mounting.

Disk nodes DN413 are for single server nodes. For the order numbers see table below.

Order number for disk node DN4x		
D:GPDS2-DN413	Disk Subsystem	Disk Subsystem for single node configuration <ul style="list-style-type: none"> <li>■ 2 SCSI strings with 7 HDD bays each for disks with SCSI U320 LVD I/F</li> <li>■ 2 SCSI connection module single port U320</li> <li>■ rack-mountable box, needs 3U in a 19"-rack</li> <li>■ 1 cable carrier (ZB527) and 1 support bracket (ZB5211) for 19"-rack BG5x are included</li> </ul>
D:GPDS2-SV30	Power supply unit	Power supply unit, providing redundant PSU configuration for D:GPDS2-DN413. <ul style="list-style-type: none"> <li>■ The redundant PSU adds dual AC power input/feed to GPDS2- DN413</li> </ul>

#### NOTES on electrical connection and installation of the box

- The " Disk Node " (DN413) can be installed in the 19-inch rack PRIMECENTER.
- The plug (IEC320) of the AC power cord, which is shipped with GPDS2-DN413, matches with the outlets of the multiple socket outlets in the 19" rack.
- The GPDS2-DN413 has two AC power cords if a redundant PSU is installed. Note that the boxes do support dual AC power input/feed when a redundant PSU is installed.
  - To support dual AC power input/feed the AC power cords (of standard PSU and redundant PSU) must be plugged into independent power grids (circuits) within the building's wiring.
  - When connecting the cables from standard PSU and redundant PSU to the same power grid (circuit) within the building's wiring, you will get redundant power supply functionality instead of dual AC power supply functionality.
  - As long as standard PSU and redundant PSU are working accurately, they share the output load. The outputs of all PSUs are connected in parallel.

#### NOTES on ordering

- The (basic) disk node for 19" rack (GPDS2- DN413) does NOT include HDDs. HDDs must be ordered as separate items.
- To configure DN413 with redundant power supply or support dual AC power input/feed, a redundant PSU (GPDS2-SV30) must be ordered.
- The maximum Disks are 7 per SCSI string and 14 per Disk Node Box GPDS2-DN413.
- Standard cable carrier and support brackets for 19" racks PCR2 (BG5x)
  - All basic boxes for DN413 include support brackets.
  - 1 cable carrier (ZB527) for mounting within 19" rack BG5x belongs to all DN413
- The diagnostic is done via SCSI in band SAF-TE (SCSI Access Fault-Tolerant Enclosure).
- Daisy chaining of disk nodes/ packages DN413) or daisy chaining of the 2 strings of one disk node is not supported.
- The disk node DN413 comes without SCSI cable. 1 SCSI cable has to be ordered for each connection from a SCSI string (=7 HDD bays) to a SCSI controller within a node as separate items. Order numbers see below chapter drawing.
- You may connect the 2 strings of a disk node DN413 to different compute nodes. The DN413 is switched ON/OFF by "terminator power" from the SCSI controller, i.e. ON with ON of the first compute node and OFF with OFF of the last compute node. If the temperature inside the DN413 reaches an abnormal level (because of a fatale error), all connected compute nodes shut down and switch off the disk node.

**Hard Disk drives for DN413\***

D:GPDS2-FP84	Hard disk 73GB 15kRpm	73 GByte 15,000rpm, Ultra SCSI LVD320 Fast drives with short access time
D:GPDS2-FP84	Hard disk U320 10k 146 GB	146 GByte 10,000rpm, Ultra SCSI LVD320
D:GPDS2-FP85	Hard disk U320 10k 300 GB	300 GByte 10,000rpm, Ultra SCSI LVD320
<del>D:GPDS2-HDP3</del>	<del>HD bundle with 4 x 73 GB 15Krpm</del>	<del>292 GByte of disk space, 4 drives 73 GByte each</del>
D:GPDS2-HDP4	HD packet with 4 x 146 GB U320 10Krpm	584 GByte of disk space, 4 drives 146 GByte each Allowed in DN413.
D:GPDS2-FP86	Hard disk 73GB 15kRpm	73 GByte 15,000rpm, Ultra SCSI LVD320 Fast drives with short access time
D:GPDS2-HDP5	HD bundle with 4 x 73 GB 15Krpm	292 GByte of disk space, 4 drives 73 GByte and 15,000rpm each

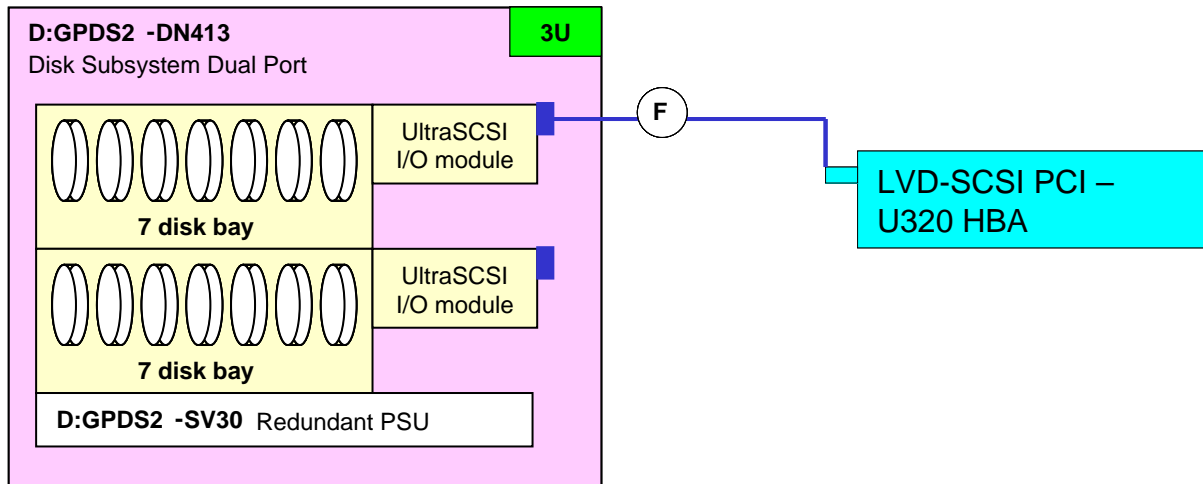
**NOTES on disks for DN413:**

- These HDDs can be mounted in „DN413 boxes“ only, but NOT in system cabinets.

**Disk subsystems, cable connection diagrams with cable list**

**Connecting Disk node DN413 to SCSI HBAs within single node configurations (up to 320 MByte/s)**

DN413 is not usable for shared disks in cluster configurations.



The second UltraSCSI I/O module in this drawing can either be connected to the second port of a DualPort HBA or to another HBA which may or may not belong to another partition.

**Cables for connecting disk nodes -DN413 to U320 SCSI HBA (up to 320 MByte/s)**

<b>F</b>	D:GPDS2-KB04	SCSI cable UHD68(S)-UHD68(S) 4m (DN41*)	Note on cable carrier: The cable carrier GPRAC-ZB527 requires additional cable length of approx. 1m
	D:GPDS2-KB05	SCSI cable UHD68(S)-UHD68(S) 5m (DN41*)	
	D:GPDS2-KB10	SCSI cable UHD68(S)-UHD68(S) 10m (DN41*)	
	SNP:SY-F2365E500-P	SCSI cable UHD68(S)-UHD68(S), customized length needed, if the rack internal cabling shall be done by factory.	

**BG57 for accessible devices**

**Order number for BG57**

D:EPRCK-BG57	19" Rack Box f. changeable Peripheral 2channel U160	Rack-mountable box, 3 HU, 4 bays (1.6" high) <ul style="list-style-type: none"> <li>■ 2 SCSI strings (2 bays each) as standard</li> <li>■ 4 SCSI strings (1 bay each) with optional EPRCK-AN60</li> <li>■ 1 SCSI strings (4 bays) with optional EPRCK-AN62</li> <li>■ Each SCSI string may be connected to a different server.</li> </ul> <b>Note:</b> NO redundant PSU available.
D:EPRCK-AN60	Upgrade kit PW BG57 to 4channel U160	For configurations with 4 SCSI strings with 1 bay each or 3 strings with 2x1 plus 1x2 bays.
D:EPRCK-AN62	Change kit PW BG57 to 1channel U160	For connecting the 4 bays of one BG57 to 1 SCSI string
D:EPBOX-AN55	Adoption set for 8bit SE devices	1 adapter AN55 required for each 8-bit device within a BG55/BG57 box

**Drives for BG57**

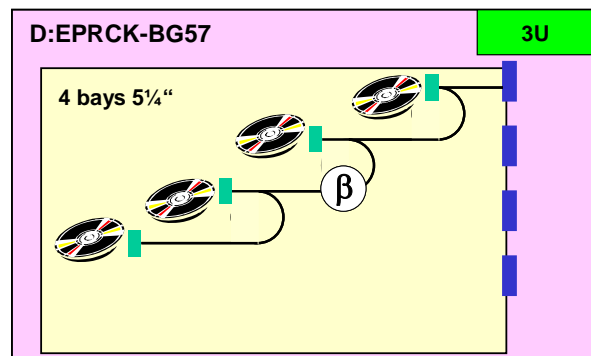
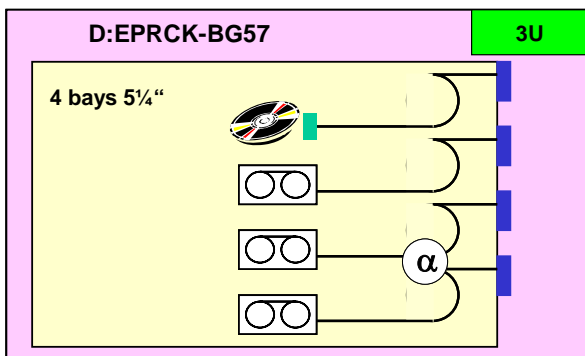
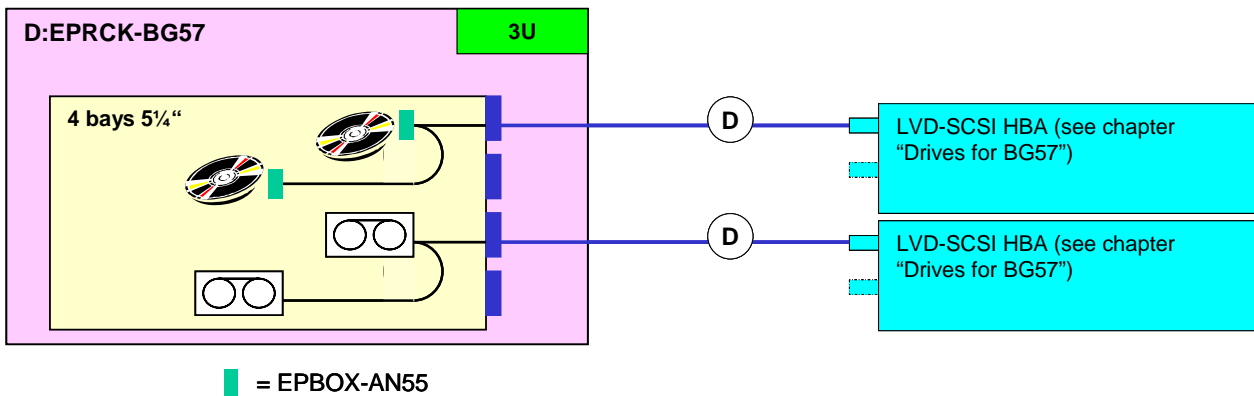
D:EPBOX-MC57	MTC DAT72, 36-72GB, box	16bit LVD	36 GByte (native) to 72 GByte (compressed) <ul style="list-style-type: none"> <li>■ Install in EPRCK-BG57 rack mountable box only</li> <li>■ Do NOT mix with 8bit drive within 1 box</li> <li>■ Current ControlPCD required</li> </ul>
D:EPBOX-MC77	MTC 8mm, 80-160GB	16bit LVD	80 GByte (native) to 160 GByte (compressed) <ul style="list-style-type: none"> <li>■ Install in EPRCK-BG57 rack mountable box only</li> <li>■ Do NOT mix with 8bit drive within 1 box</li> <li>■ Current ControlPCD required</li> </ul>
D:EPBOX-MC88	MTC LTO 2 HH, 200/400GB	16bit LVD	200 GByte (native) to 400 GByte (compressed) <ul style="list-style-type: none"> <li>■ Install in EPRCK-BG57 rack mountable box only</li> <li>■ Do NOT mix with 8bit drive within 1 box</li> </ul>

**NOTES on BG57 MTC drives:**

- These devices can be mounted in BG57 boxes only, NOT in system cabinets.

**BG57 for accessible devices, cable connection diagrams with list of cables**

**Connecting BG57 to controller with LVD I/F**



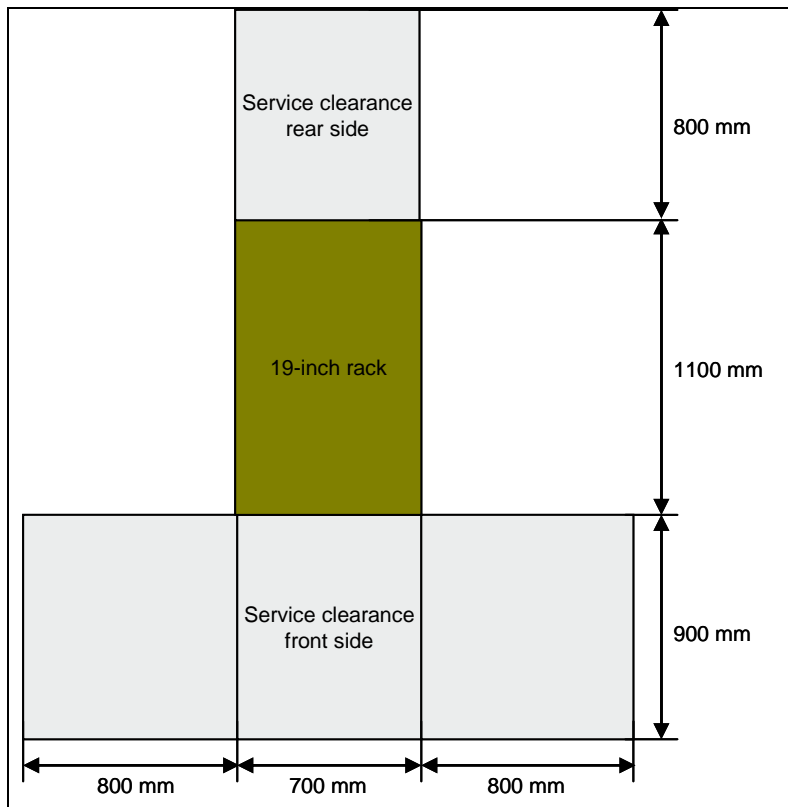
**Cables for connecting BG57 boxes to SCSI controller (up to 80MByte/s, device dependent)**

D	D:KB235-M3	SCSI cable 3m (68pin UHD and 68pin Amplimite)	These cables can be installed if the boxes contain drives with <u>LVD I/F only</u> .
	D:KB235-M5	SCSI cable 5m (68pin UHD and 68pin Amplimite)	
	D:KB235-M8	SCSI cable 8m (68pin UHD and 68pin Amplimite)	
	D:KB243-M10	SCSI Connection Cable, 10m	

**Cables to configure the BG57 box**

α	EPRCK-AN60	Upgrade kit PW BG57 to 4 channel U160	The cable connects 1 or 2 bays in a BG57 to 1 input connector of the box. 2 cables are included in the kit 1 kit (=2 cables) are included in BG57
β	EPRCK-AN62	Change kit PW BG57 to 1 channel U160	This kit is needed when all 4 bays must be connected in daisy chain to 1 input connector of the box. The standard cables of the box cannot be used in this case.

**Service clearance**



**M5000 Connectivity**

Please refer also to:

**Sparc Enterprise Server**

Link:

<http://partners.fujitsu-siemens.com/com/products/servers/unix/server%20hardware/SPARC%20Enterprise%20server/Pages/default.aspx>

**Powertool**

Link:

<http://partners.fujitsu-siemens.com/com/products/servers/unix/Config%20and%20Tools/SPARC%20Enterprise%20Server%20Powerconfigurator/Pages/default.aspx>

**Available and supported external storage peripherals and UPS**

Links:

Please refer to:

<http://partners.fujitsu-siemens.com/com/products/storage/Pages/default.aspx>

<http://partners.fujitsu-siemens.com/com/products/servers/primergy/conftools/MatrixEP/MatrixEP/Pages/default.aspx>

**PRIMEPOWER Open Connectivity (incl. IHV Support Matrix)**

**Link:**

Open page:

<http://partners.fujitsu-siemens.com/com/products/servers/consulting/Pages/default.aspx>

[http://extranet3.fujitsu-siemens.com/products/consulting/prof\\_services/open\\_connectivity](http://extranet3.fujitsu-siemens.com/products/consulting/prof_services/open_connectivity)

**Information about UPS (Uninterruptable Power Supplys):**

UPSes are only available up to 20kVA for M8000 (Masterguard, rack mounted, single phase). UPSes with more power (or 3phase) are not available yet (at FSC), but the connection/installation is supported by partners like MASTERGUARD. 20kVA APC planned.

**Links:**

<http://partners.fujitsu-siemens.com/com/products/servers/unix/Pages/default.aspx>

**Support Page**

**Link:**

For Datasheets for Service Packs / Service Contracts please refer to:

[http://www.fujitsu-siemens.com/services/productrelated\\_services/enterprise\\_services.html](http://www.fujitsu-siemens.com/services/productrelated_services/enterprise_services.html)

**PRIMECENTER Rack**

**Link:**

<http://partners.fujitsu-siemens.com/com/products/servers/primergy/rackcomp/racks/Pages/default.aspx>

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